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CR-103195
DMS-DR-1044



—SPACE SHUTTLE—

**S-IC BOOSTER/GRUMMAN C4 ORBITER
DETERMINATION OF DOWNWASH
ON 900 FT², 30° ORIENTED S-IC
FINS AND OPTIMUM ORBITER BODY
AND AERODYNAMIC SURFACE
INCIDENCE ANGLES**

**MARSHALL
SPACE FLIGHT CENTER
TRISONIC
WIND TUNNEL TEST RESULTS
DATA REPORT**

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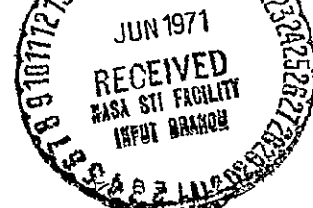
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SCHEDULE II

DRL 184-58

AMENDMENT 130

MARSHALL SPACE FLIGHT CENTER



**SADSAC SPACE SHUTTLE
AEROTHERMODYNAMIC
DATA MANAGEMENT SYSTEM**

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16. ABSTRACT Experimental aerodynamic investigations were made during November 1970 in the MSFC 14 x 14 inch wind tunnel on a Saturn S-IC booster coupled to a Grumman C-4 orbiter for the purposes of: <ul style="list-style-type: none"> a) Determining the downwash on 900 ft², 30 degree oriented S-IC fins b) Determining the optimum attachment angle of orbiter to booster c) Evaluating booster fin orientation d) Determining directional stability e) Determining orbiter wing loads and horizontal tail effectiveness f) Determining the effectiveness of wing spoilers in reducing downwash g) Evaluating effects of the strong back, and orbiter wing incidence angle. Data were collected over a Mach number range from 0.6 to 1.96 at angles of attack varying from -13° to 13° at zero degrees sideslip and from -2° to 19° sideslip at zero degrees angle of attack. Six component force and moment data were recorded and are presented herein in plotted form. Contract No. NAS8-4016 with Chrysler Corporation is for data presentation of information generated by various Space Shuttle Phase B Contractors and NASA Centers.					
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SADSAC/SPACE SHUTTLE
WIND TUNNEL TEST DATA REPORT

CONFIGURATION: S-IC BOOSTER/GRUMMAN ORBITER-C4; 0.003366 MODEL SCALE
TEST PURPOSE: DETERMINE DOWNWASH ON 900 FT², 30° ORIENTED S-IC FINS
AND OPTIMUM ORBITER BODY AND AERODYNAMIC SURFACE
INCIDENCE ANGLES
TEST FACILITY: NASA MSFC 14" TRISONIC WIND TUNNEL
TESTING AGENCY: THE BOEING COMPANY
TEST NO. & DATE: TWT 470; NOV. 4-14, 1970
TEST CONDUCTOR(S): L. C. SHROUT, M. Y. OIYE, R. M. MILLER
SADSAC COORDINATOR: J. WEAVER

DATA MANAGEMENT SERVICES

LIAISON: N/A DATA OPERATIONS: B. J. Fricken
B. J. Fricken

RELEASE APPROVAL: N. D. Kemp
N. D. Kemp, Supervisor
Aero Thermo Data Group

This report has been prepared by Chrysler Corporation Space Division under a Data Management Contract to the NASA. Chrysler assumes no responsibility for the data presented herein other than its display characteristics.

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SUMMARY

Experimental aerodynamic investigations were made during November 1970 in the MSFC 14 x 14 inch wind tunnel on a Saturn S-IC booster coupled to a Grumman C-4 orbiter for the purposes of:

- a) determining the downwash on 900 ft², 30 degree oriented S-IC fins
- b) determining the optimum attachment angle of orbiter to booster
- c) evaluating booster fin orientation
- d) determining directional stability
- e) determining orbiter wing loads and horizontal tail effectiveness
- f) determining the effectiveness of wing spoilers in reducing downwash
- g) evaluating effects of the strong back, and orbiter wing incidence angle.

Data were collected over a Mach number range from 0.6 to 1.96 at angles of attack varying from -13° to 13° at zero degrees sideslip and from -2° to 19° sideslip at zero degrees angle of attack. Six component force and moment data were recorded and are presented herein in plotted form.

TEST CONDITIONS

Table I presents the range of test variables at which data were recorded and gives some estimate of the data accuracy.

Trip strips used in the test were #120 grit, 0.06 inch wide located at 10% chord aft of the leading edge on all aerodynamic surfaces (see Figure 1). The nose of the orbiter has a trip strip .06 inch wide with #120 grit located 10% orbiter length aft of the nose tip.

The model was sting mounted in the tunnel as depicted in Figure 1. Pitch runs were made with the model upright while sideslip runs were made in the tunnel pitch plane with the sting and model rolled 90° .

Base pressures were measured in three locations as shown in Figure 13.

The orbiter was attached to the booster with an orbiter sting. The variable orbiter incidence settings of -4° , -2° , -1.05° , and 0° were obtained by pivoting the orbiter about a pin at the launch C.G. and setting the angle with pins through the body and orbiter sting.

Wing incidence changes of $+4^\circ$ and $+2^\circ$ were obtained using wedged shims and different bolt patterns.

Horizontal tail incidence settings of -5° and 0° were obtained using wedged shims and a loose fitting bolt pattern.

The strongback was attached to the orbiter by bolts. The gap between the orbiter and booster was faired with red wax.

The booster body fin combinations were varied using boosters with or without the fins brazed into permanent locations.

Spoilers were simulated by attaching 1/8 inch key stock pieces, 0.7 inch long to the top surface of the wing with epoxy. The leading edge of the spoilers was located on the 15 percent chord line and ran 40 percent of the distance from tip of the orbiter wing to the body.

TABLE I
TEST CONDITIONS
TEST MSFC TWT 470

[illegible]

BALANCE UTILIZED: MSFC #226

CAPACITY:

NF	<u>150 lbs</u>
SF	<u>50 lbs.</u>
AF	<u>30 lbs.</u>
PM	<u>317 in-lbs</u>
YM	<u> </u>
RM	<u>40 in-lbs</u>

DATA
ACCURACY:

+	0.5%
+	2.0%
+	7.5%
+	6.0%
<hr/>	
±	2.0%

COEFFICIENT
TOLERANCE:

10

COMMENTS:

The above accuracies are based on repeatability of data runs and re-runs during this test.

* Data inaccuracies for this test were compounded by:

- a. Location of both sets of balance gages aft of the configuration aerodynamic center.
- b. Incomplete balance temperature compensation.

DATA REDUCTION

A six component internal strain gage balance was utilized to measure the aerodynamic forces and moments acting on the model. The loads have been reduced to coefficient form using the following reference values:

$$S_{\text{ref}} = \text{booster body X-sectional area} = 1.396 \text{ in}^2$$

$$l_{\text{ref}} = b_{\text{ref}} = \text{booster body diameter} = 1.333 \text{ inches}$$

$$A_b = \text{booster base area} = 1.039 \text{ in}^2$$

$$A_{\text{cav}} = \text{booster balance cavity area} = 1.131 \text{ in}^2$$

Moment data are reduced about a reference C.G. location which is on the longitudinal centerline at model station 5.264 (booster base is station 0.249 (REF)).

Model base and balance cavity area pressures were recorded during these tests and are presented in the plots. Axial force coefficients are presented both uncorrected (C_A) and corrected (C_{AF}) for the pressures.

CONFIGURATIONS INVESTIGATED

COMPONENT NOMENCLATURE

- O = Orbiter Body Drawing No. 518MOD411 (Figure 3)
- B = S-IC Body Drawing No. GDC 383-4 (Figure 9)
- W = Orbiter Wing Drawing No. 518MOD412 (Figure 4)
- W₁ = Orbiter Wing Drawing No. 518MOD412 with spoilers added (Figure 5)
- H = Orbiter Horizontal Tail Drawing No. 518MOD413 (Figure 6)
- V = Orbiter Vertical Tail Drawing No. 518MOD413 (Figure 6)
- F₁ = S-IC 900 ft² Fins Each Mounted at $\pm 30^\circ$ Angle from horizontal
Drawing GDC 383-12 (Figure 10)
- F₂ = S-IC 900 ft² Fins Each Mounted at $\pm 45^\circ$ Angle from horizontal
(PHIB = 0°) Drawing GDC 383-12 (Figure 11)
- S = Strongback Drawing GDC 383-9 (Figure 12)

The immediately following pages give pertinent dimensional information on the above components.

COMPONENT COMBINATIONS TESTED

BOHVS

BOWHVS

BF₁OHVS

BF₁OWHV

BF₁OWHVS

BF₁OW₁HVS

BF₂OWHVS, PHIB = 0°

BF₂OWHVS, PHIB = 45°

TABLE II
MODEL INSPECTION DATA

ORBITER INCIDENCE

NOMINAL	MEASURED
0°	0°
-2°	-1°57'
-4°	-4°0'

WING INCIDENCE

NOMINAL	LEFT TIP	RIGHT TIP	BOTTOM
2°	1.2°	0.6°	
4°	3.6°	2.8°	3°38'

HORIZONTAL TAIL INCIDENCE

NOMINAL	LEFT TIP	RIGHT TIP	BOTTOM
-5°	-4.6°	-5.5°	-5°56'
0°	+0.2°	-0.2°	-59'

NOTE: These angles were measured using an optical comparator. It was not possible to define a tip reference chord for the wing and horizontal tail.



MODEL COMPONENT: BODY - B


GENERAL DESCRIPTION: 0.003366 SCALE S-1C BOOSTER

DRAWING NUMBER:

GDC383-4

DIMENSIONS:

	<u>FULL-SCALE</u>	<u>MODEL SCALE</u>
Length	<u>130.33 FT</u>	<u>5.101 IN</u>  <u>5.264 IN</u> 
Max. Width	<u>46.84 FT</u>	<u>1.893 IN</u>
Max. Depth	<u>46.84 FT</u>	<u>1.893 IN</u>
Fineness Ratio	<u>.276</u>	<u>.276</u>
BODY DIA	<u>33 FT</u>	<u>1.333 IN</u>
Area		
Max. Cross-Sectional BODY	<u> </u>	<u>1.396 IN²</u>
Planform	<u> </u>	<u> </u>
Netted	<u> </u>	<u> </u>
Base TOTAL	<u> </u>	<u>2.170 IN²</u>
CAVITY		<u>1.131 IN²</u>
SOLID BASE		<u>1.039 IN²</u>

 TO END OF ENGINE FAIRING

 TO STATION 0.00

MODEL COMPONENT: BODY -0

GENERAL DESCRIPTION: .003366 SCALE GRUMMAN C-4 ORBITER

DRAWING NUMBER: B.34 LO190-504 518 MOD 411

<u>DIMENSIONS:</u>	<u>FULL-SCALE</u>	<u>MODEL SCALE</u>
Length	<u>1460 IN</u>	<u>5.150 IN</u>
Max. Width	<u>402 IN</u>	<u>1.23 IN</u>
Max. Depth	<u>352 IN</u>	<u>1.192 IN</u>
Fineness Ratio	<u> </u>	<u> </u>
Area		
Max. Cross-Sectional	<u> </u>	<u> </u>
Planform	<u> </u>	<u> </u>
Wetted	<u> </u>	<u> </u>
Base	<u> </u>	<u> </u>

MODEL COMPONENT: WING - W

GENERAL DESCRIPTION: .003366 SCALE GRUMMAN ORBITER

DRAWING NUMBER:

B34L0190-504

518 MOD 412

DIMENSIONS:

FULL-SCALE

MODEL SCALE

TOTAL DATA

Area		
Planform	<u>2280 FT²</u>	<u>3.72 IN²</u>
Wetted		
Span (equivalent)	<u>117 FT</u>	<u>4.726 IN</u>
Aspect Ratio	<u>6.0</u>	<u>6.0</u>
Rate of Taper	<u>.3298</u>	<u>.3298</u>
Taper Ratio	<u>.34</u>	<u>.338</u>
Dihedral Angle, degrees	<u>7°</u>	<u>7°</u>
Incidence Angle, degrees		
Aerodynamic Twist, degrees	<u>0.0</u>	<u>0.0</u>
Toe-In Angle		
Cant Angle		
Sweep Back Angles, degrees		
Leading Edge	<u>18.25°</u>	<u>18.25°</u>
Trailing Edge	<u>0°</u>	<u>0°</u>
0.25 Element Line	<u>14°</u>	<u>13.88°</u>
Chords:		
Root (Wing Sta. 0.0)	<u>29.1 FT</u>	<u>1.177 IN</u>
Tip, (equivalent)	<u>9.85 FT</u>	<u>.398 IN</u>
MAC	<u>21.05 FT</u>	<u>.852 IN</u>
Fus. Sta. of .25 MAC	<u>1010.1 IN</u>	<u>3.40 IN</u>
W.P. of .25 MAC		
B.L. of .25 MAC	<u>24.4 FT</u>	<u>.985 IN</u>
Airfoil Section		
Root	<u>0014-64</u>	<u>0014-64</u>
Tip	<u>0010-64</u>	<u>0010-64</u>

EXPOSED DATA

Area	<u>1510 FT²</u>	<u>2.63 IN²</u>
Span, (equivalent)	<u>86.6 FT</u>	<u>3.726 IN</u>
Aspect Ratio	<u>5.09</u>	<u>5.28</u>
Taper Ratio	<u>.409</u>	<u>.393</u>
Chords		
Root	<u>24.1 FT</u>	<u>1.012 IN</u>
Tip	<u>9.85 FT</u>	<u>.398 IN</u>
MAC	<u>18.0 FT</u>	<u>.750 IN</u>
Fus. Sta. of .25 MAC	<u>1038 IN</u>	<u>3.48 IN</u>
W.P. of .25 MAC		
B.L. of .25 MAC	<u>404 IN</u>	<u>1.295 IN</u>

NOTE: FUS. STATION REFERENCE TO ORBITER

MODEL COMPONENT: H-HORIZONTAL TAIL

GENERAL DESCRIPTION: 0.003366 SCALE GRUMMAN C-4 ORBITER

DRAWING NUMBER:

B34L0190-504

518 MOD 413

DIMENSIONS:

FULL-SCALE

MODEL SCALE

TOTAL DATA

Area

Planform

1032 FT²

Wetted

Span (equivalent)

75 FT

Aspect Ratio

5.45

Rate of Taper

Taper Ratio

.407

Diehedral Angle, degrees

0°

Incidence Angle, degrees

0°

Aerodynamic Twist, degrees

Toe-In Angle

Cant Angle

Sweep Back Angles, degrees

Leading Edge

17°

17°

Trailing Edge

0°

0°

0.25 Element Line

Chords:

Root (Wing Sta. 0.0)

19.583 FT

Tip, (equivalent)

8.00 FT

.373 IN

MAC

173"

Fus. Sta. of .25 MAC

1656 IN

W.P. of .25 MAC

B.L. of .25 MAC

195 IN

Airfoil Section

Root

0010-64

0010-64

Tip

0010-64

0010-64

EXPOSED DATA

Area

525 FT

981 IN²

Span, (equivalent)

3.86

2.046 IN

Aspect Ratio

.533

4.27

Taper Ratio

.533

.500

Chords

Root

177 IN

.636 IN

Tip

96 IN

.373 IN

MAC

142 IN

.470 IN

Fus. Sta. of .25 MAC

1680 IN

4.991 IN

W.P. of .25 MAC

B.L. of .25 MAC

303 IN

.956 IN

NOTE: FUS. STATION REFERENCE TO ORBITER

MODEL COMPONENT: V - VERTICAL TAIL

GENERAL DESCRIPTION: 0.00 3366 SCALE GRUMMAN C-4 ORBITER

DRAWING NUMBER: B34L0190-504

518 MOD 413

DIMENSIONS:

FULL-SCALE

MODEL SCALE

TOTAL DATA

Area		
Planform	925 FT ²	
Wetted		
Span (equivalent)		
Aspect Ratio	1.67	
Rate of Taper		
Taper Ratio	.33	
Diehedral Angle, degrees		
Incidence Angle, degrees		
Aerodynamic Twist, degrees		
Toe-In Angle		
Cant Angle		
Sweep Back Angles, degrees		
Leading Edge	47	
Trailing Edge		
0.25 Element Line		
Chords:		
Root (Wing Sta. 0.0)		
Tip, (equivalent)	136 IN	
MAC	293 IN	
Fus. Sta. of .25 MAC	1662	
W.P. of .25 MAC	122 IN. ABOVE FRL	
B.L. of .25 MAC	0.0	
Airfoil Section		
Root		
Tip		

EXPOSED DATA

Area	535 FT ²	.768 IN ²
Span, (equivalent)		1.037 IN
Aspect Ratio		.74
Taper Ratio	.434	.433
Chords		
Root	308 IN	1.037 IN
Tip	136 IN	.448 IN
MAC	230 IN	.774 IN
Fus. Sta. of .25 MAC	1662	4.887
W.P. of .25 MAC	230 IN. ABOVE	.774 IN. ABOVE
B.L. of .25 MAC	0.0 FRL	0.0 FRL

NOTE: FUS. STATION REFERENCE TO ORBITER

MODEL COMPONENT: FIN - F₁, F₂

GENERAL DESCRIPTION: 0.003366 SCALE 900 FT² FINS

F₁ MOUNTED AT 30° ; F₂ MOUNTED AT 45°

DRAWING NUMBER: _____

DIMENSIONS: EACH FIN 4 TOTAL

FULL-SCALE

MODEL SCALE

TOTAL DATA

Area		
Planform		1.541 IN ²
Wetted		1.381 IN ²
Span, (equivalent)		
Aspect Ratio		
Rate of Taper		
Taper Ratio		
Diehedral Angle, degrees		
Incidence Angle, degrees		
Aerodynamic Twist, degrees		
Toe-In Angle		
Cant Angle		
Sweep Back Angles, degrees		
Leading Edge	30°	30°
Trailing Edge	0°	0°
0.25 Element Line		
Chords:		
Root (Wing Sta. 0.0)		
Tip, (equivalent)		
MAC		
Fus. Sta. of .25 MAC		
W.P. of .25 MAC		
B.L. of .25 MAC		
Airfoil Section		
Root		
Tip		

EXPOSED DATA

Area	154230 IN ²	1.541 IN ²
Span, (equivalent)	485 IN	1.237 IN
Aspect Ratio	1.525	1.237
Taper Ratio		.474
Chords		
Root	450 IN	1.515 IN
Tip	186 IN	1.117 IN
MAC		1.242 IN
Fus. Sta. of .25 MAC		.895 IN
W.P. of .25 MAC		1.275 IN
B.L. of .25 MAC		1.275 IN

TEST MSFC TWT 470 DATA SET COLLATION SHEET

☐ PRETEST
☒ POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		PARAMETERS/VALUES				NO. of RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)											
		α	β	i_o	i_{we}	i_{ho}	Q_B		0.6	0.9	1.0	1.1	1.2	1.46	1.96	1.3				
R24011	BE ₁ OWHVS	A	0	0	+4	0	0	7	001/1	002/2	003/1	004/0	005/0	006/0	007/0					
R24021	↓	A		0				7	028/0	029/0	026/0	025/0	024/0	023/0	022/0					
R24031	↓	C		-2				7	029/0	037/0	031/0	032/0	033/0	034/0	035/0					
R24041	↓			-4				7	036/0	037/0	034/0	033/0	049/0	044/0	042/0					
R24051	BOWHVS			0				7	043/0	044/0	045/0	046/0	047/0	048/0	049/0					
R24061	↓			-2				7	050/0	051/0	052/0	053/0	054/0	055/0	056/0					
R24071	↓			-4				7	057/0	058/0	059/0	060/0	061/0	062/0	063/0					
R24081	BE ₁ OWHVS			-1.05		↓		8	064/0	065/0	066/0	067/0	068/2	069/1	070/0	170/0				
R24091	↓					-5		7	071/0	072/0	073/0	074/0	075/0	076/0	077/0					
R24101	BOHVVS				-	0		1			171/0									
R24111	BE ₁ OHVS				-		↓	4			087/0	088/0	089/0	090/0						
R24121	BE ₂ OWHVS				+4		45	4			094/0		096/0	097/0		175/0				
R24131	↓	↓	↓				0	4			101/0		103/0	104/0		174/0				
R24132	↓	0	B					7	106/0	107/0	108/0		110/0	111/0	112/0	173/0				
R24022	BE ₁ OWHVS	0	B		↓			8	113/0	114/0	115/2	116/0	117/0	118/0	119/0	172/0				
R24141	↓	C	0		+2			4			143/0	144/0	145/0	146/0						
R24151	BE ₁ OWHV				+4			4			150/0	151/0	152/0	153/0						
R24161	BE ₁ OW ₁ HVS	↓	↓	↓	+4	↓	↓	8	162/0	163/0	164/0	165/0	166/0	167/0	168/0	169/0				

1 7 13 19 25 31 37 43 49 55 61 67 7576
CLM ICN CYN CY CBL CA CAF CPB1 CPB2 CPCAV 10

COEFFICIENTS:

α or β

SCHEDULES

$\alpha A = -10, -8, -6, -4, -3, -2, -1, 0, 1, 2, 3, 4, 6, 8, 10$
 $\alpha C = -8, -6, -4, -3, -2, -1, 0, 1, 2, 3, 4, 6, 8$
 $\beta B = -1.5, -1.0, 0, 1, 2, 4, 6, 8, 10, 12, 14, 16$

⇒ IDPVAR(1) IDPVAR(2) NDV

TEST MSEC TWT 470 DATA SET DESCRIPTOR SHEET

DATA SET IDENTIFIER	DATA SET DESCRIPTOR				Mode Type	CURVE SLOPE RANGE	
	11	21	31	41		51 LOWER LIMIT	61 UPPER LIMIT
R24011	TWT470, S-EC/GAG ØREITER, BF1ØWHVS, NO TRIP STRIP				1.1		
R24021	FINS ØN				1.1		
R24031	FINS ØN				1.1		
R24041	FINS ØN				1.1		
R24051	BØWHVS, FINS, ØFF				1.1		
R24061	FINS, ØFF				1.1		
R24071	FINS, ØFF				1.1		
R24081	BF1ØWHVS, BASIC				1.1		
R24091	BASIC				1.1		
R24101	BØHVS, WING, FINS, ØFF				1.1		
R24111	BF1ØHVS, WING, ØFF				1.1		
R24121	BF2ØWHVS, PHIB, = 45				1.1		
R24131	PHIB, F. O.				1.1		
R24132	CRUCIFORM				2.1		
R24132	BF1ØWHVS, BASIC				2.1		
R24141	WING, INC, = 2				1.1		
R24151	BF1ØWHV, STRØNGBACK, ØFF				1.1		
R24161	BF1ØW1HVS, WING, SPØILERS				1.1		

16

1	SREF(1)	11	SREF(2)	21	LREF(1)	31	LREF(2)	41	BREF(1)	51	BREF(2)	61	XMRF(1)	71	XMRF(2)
	1.396		SQ.IN.		1.333		IN.		1.332		IN.		5.264		IN.
	0.0		IN.		0.0		IN.		10.3366		PERCENT				
	YMRP(1)		YMRP(2)		ZMRP(1)		ZMRP(2)		SCALE(1)		SCALE(2)				FILREF

TEST FACILITY DESCRIPTION

The Marshall Space Flight Center 14" x 14" Trisonic Wind Tunnel is an intermittent blowdown tunnel which operates by high pressure air flowing from storage to either vacuum or atmospheric conditions. A Mach number range from .2 to 5.85 is covered by utilizing two interchangeable test sections. The transonic section permits testing at Mach 0.20 through 2.50, and the supersonic section permits testing at Mach 2.74 through 5.85. Mach numbers between .2 and .9 are obtained by using a controllable diffuser. The range from .95 to 1.3 is achieved through the use of plenum suction and perforated walls. Mach numbers of 1.44, 1.93 and 2.50 are produced by interchangeable sets of fixed contour nozzle blocks. Above Mach 2.50 a set of fixed contour nozzle blocks are tilted and translated automatically to produce any desired Mach number in .25 increments.

Air is supplied to a 6000 cubic foot storage tank at approximately -40°F dew point and 500 psi. The compressor is a three-stage reciprocating unit driven by a 1500 hp motor.

The tunnel flow is established and controlled with a servo actuated gate valve. The controlled air flows through the valve diffuser into the stilling chamber and heat exchanger where the air temperature can be controlled from ambient to approximately 180°F . The air then passes through the test section which contains the nozzle blocks and test region.

Downstream of the test section is a hydraulically controlled pitch sector that provides a total angle of attack range of 20° ($\pm 10^{\circ}$). Sting offsets are available for obtaining various maximum angles of attack up to 25° .

The diffuser section has movable floor and ceiling panels which are the primary means of controlling the subsonic Mach numbers and permit more efficient running supersonically. The sector assembly and supersonic diffuser telescope into the subsonic diffuser to allow easy access to the model and test section.

Tunnel flow is exhausted through an acoustically damped tower to atmosphere or into the vacuum field of 42,000 cubic feet. The vacuum tanks are evacuated by vacuum pumps driven by a total of 500 hp.

Data is recorded by a solid state digital data acquisition system. The digital data is transferred to punched cards during the run to be reduced later by a computer to proper coefficient form.

The tunnel components and performance are discussed in more detail in NASA TM X-53185, dated December 22, 1964, and NASA TM X-53113, dated August 20, 1964.

NOMENCLATURE

<u>SYMBOL</u>	<u>SADSAC SYMBOL</u>	<u>DEFINITION</u>
A_b		base area; m^2 , ft^2 , in^2
a		speed of sound; m/sec, ft/sec
AR	ASPECT	aspect ratio, b^2/S
b	REFB	wing span or reference span; m, ft, in
c		wing chord; m, ft, in
\bar{c}		wing mean aerodynamic chord or reference chord; m, ft, in
c.g.		center of gravity
C.P.		center of pressure
C_A	CA	axial force coefficient, F_A/qS_{ref}
C_{A_b}	CAB	base axial force coefficient, $[(p_\infty - p_b)/q] (A_b/S_{ref})$
C_{A_f}	CAF	forebody axial force coefficient, $C_A - C_{A_b}$
C_D	CDTOTL	drag force coefficient in the wind axis system, $F_D/q S_{ref}$

NOMENCLATURE (continued)

<u>SYMBOL</u>	<u>SADSAC SYMBOL</u>	<u>DEFINITION</u>
C'_D	CD	drag force coefficient in the stability axis system, $F'_D/q S_{ref}$
C_L	CL	lift force coefficient (stability or wind axis) $F_L/q S_{ref}$
C_l	CBL	rolling moment coefficient in body axis system, $M_x/q S_{ref} b$
$C_{l,s}$	CSL	rolling moment coefficient in the stability axis system, $M_{x,s}/q S_{ref} b$
$C_{l,w}$	CWL	rolling moment coefficient in the wind axis system, $M_{x,w}/q S_{ref} b$
C_m	CLM	pitching moment coefficient in the body axis system, $M_y/q S_{ref} \ell_{ref}$
$C_{m,s}$	CLM	pitching moment coefficient in the stability axis system, $C_{m,s} = C_m$
$C_{m,w}$	CPM	pitching moment coefficient in the wind axis system, $M_{y,w}/q S_{ref} \ell_{ref}$
C_N	CN	normal force coefficient in the body axis system, $F_N/q S_{ref}$

NOMENCLATURE (continued)

<u>SYMBOL</u>	<u>SADSAC SYMBOL</u>	<u>DEFINITION</u>
C_n	CYN	yawing moment coefficient in the body axis system, $M_z/q S_{ref} \ell_{ref}$
$C_{n,s}$	CLN	yawing moment coefficient in the stability axis system, $C_{n,s} = C_n$
$C_{n,w}$	CLN	yawing moment coefficient in the wind axis system, $M_{z,w}/q S_{ref} \ell_{ref}$
C_p	CP	pressure coefficient, $(p-p_\infty)/q$
C_y	CY	side force coefficient (body or stability axis system), $F_y/q S_{ref}$
C_c	CC	side force coefficient (wind axis system), $F_y/q S_{ref}$
F_A		axial force; N, lb
F_D		drag force in wind axis system; N, lb
F'_D		drag force in the stability axis system; N, lb
F_L		lift force (stability or wind axis system); N, lb
F_N		normal force; N, lb

NOMENCLATURE (continued)

<u>SYMBOL</u>	<u>SADSAC SYMBOL</u>	<u>DEFINITION</u>
F_Y		side force; N, lb
	N/A	normal to axial force ratio
ℓ_{ref}	REFL	reference length; m, ft, in
L/D	L/D	lift-to-drag ratio, C_L/C_D (stability axis system)
L/D	CL/CD :	lift-to-drag ratio, C_L/C_D (wind axis system)
M	MACH	Mach number
MRP	MRP	abbreviation for moment reference point
	XMRP	abbreviation for moment reference point on x-axis
	YMRP	abbreviation for moment reference point on y-axis
	ZMRP	abbreviation for moment reference point on z-axis
M_x		rolling moment in the body axis system; N-m, ft-lb
$M_{x,s}$		rolling moment in the stability axis system; N-m, ft-lb

NOMENCLATURE (continued)

<u>SYMBOL</u>	<u>SADSAC SYMBOL</u>	<u>DEFINITION</u>
$M_{x,w}$		rolling moment in the wind axis system; N-m, ft-lb
M_y		pitching moment in the body (or stability) axis system; N-m, ft-lb
$M_{y,w}$		pitching moment in the wind axis system; N-m, ft-lb
M_z		yawing moment in the body axis system; N-m, ft-lb
$M_{z,w}$		yawing moment in the wind axis system; N-m, ft-lb
P		static pressure; N/m ² ; psi
P		total pressure; N/m ² ; psi
q	Q(PSI) Q(PSF)	dynamic pressure; N/m ² , psi, psf
RN/L	RN/L	Reynold's number per unit length; million/ft.
S		wing area; m ² , ft ²
S _{ref}	REFS	reference area; m ² , ft ² , in ²
T		temperature; °K, °C, °R, °F
V		speed of vehicle relative to surrounding atmosphere; m/sec, ft/sec

NOMENCLATURE (continued)

<u>SYMBOL</u>	<u>SADSAC SYMBOL</u>	<u>DEFINITION</u>
i_T		tail incidence positive when trailing edge down, deg
\bar{V}		velocity of vehicle relative to surrounding atmosphere; m/sec, ft/sec
α	ALPHA	angle of attack, angle between the projection of the wind X_W -axis on the body X, Z-plane and the body X-axis; deg
β	BETA	sideslip angle, angle between the wind X_W -axis and the projection of this axis on the body X-Z-plane; deg
γ		ratio of specific heats
Γ	DIHEDRL	wing dihedral angle; deg
δ		control surface deflection angle; deg
		positive deflections are:
	AILRON	aileron - left aileron trailing edge down
	ELEVTR	elevator - trailing edge down
	RUDDER	rudder - trailing edge to the left
	FLAP	flap - trailing edge down
	TAB	tab - trailing edge down with respect to control surface
		air density; K_g/m^3 , slugs/ft ³

NOMENCLATURE (continued)

<u>SYMBOL</u>	<u>SADSAC SYMBOL</u>	<u>DEFINITION</u>
θ		pitch angle, angle of rotation about the body Y-axis, positive when the positive Z-axis is rotated toward the positive X-axis; deg
ϕ	PHI	roll angle, angle of rotation about the body X-axis, positive when the positive Y-axis is rotated toward the positive Z-axis; deg
ψ	PSI	yaw angle, angle of rotation about the body Z-axis, positive when the positive X-axis is rotated toward the positive Y-axis; deg
ϕ_B	PHIB	roll angle of booster with respect to orbiter

NOMENCLATURE (continued)

<u>SUBSCRIPTS</u>	<u>DEFINITION</u>
a	aileron
b	base
c	canard
e	elevator or elevon
f	flap
r	rudder or ruddervator
s	stability axis system
t	tail, or total conditions
w	wind axis system
ref	reference conditions
∞	freestream condition

FIGURES



FIGURE 1(a). MODEL INSTALLED IN NASA MSFC 14" TUNNEL,
0° ORBITER INCIDENCE ANGLE

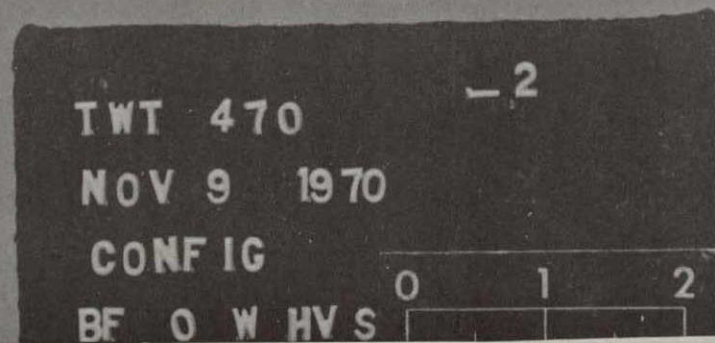
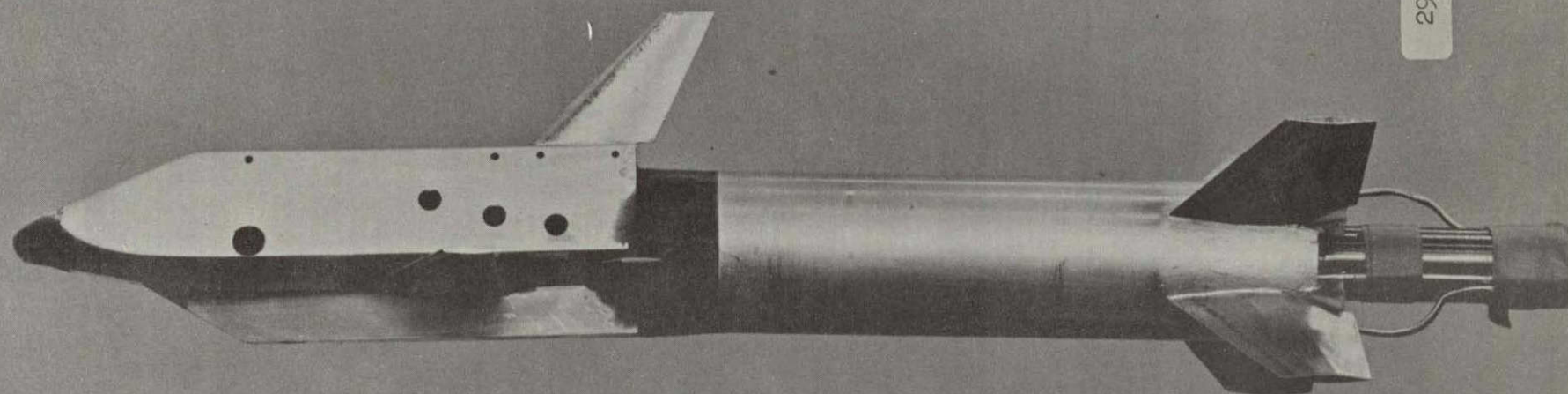
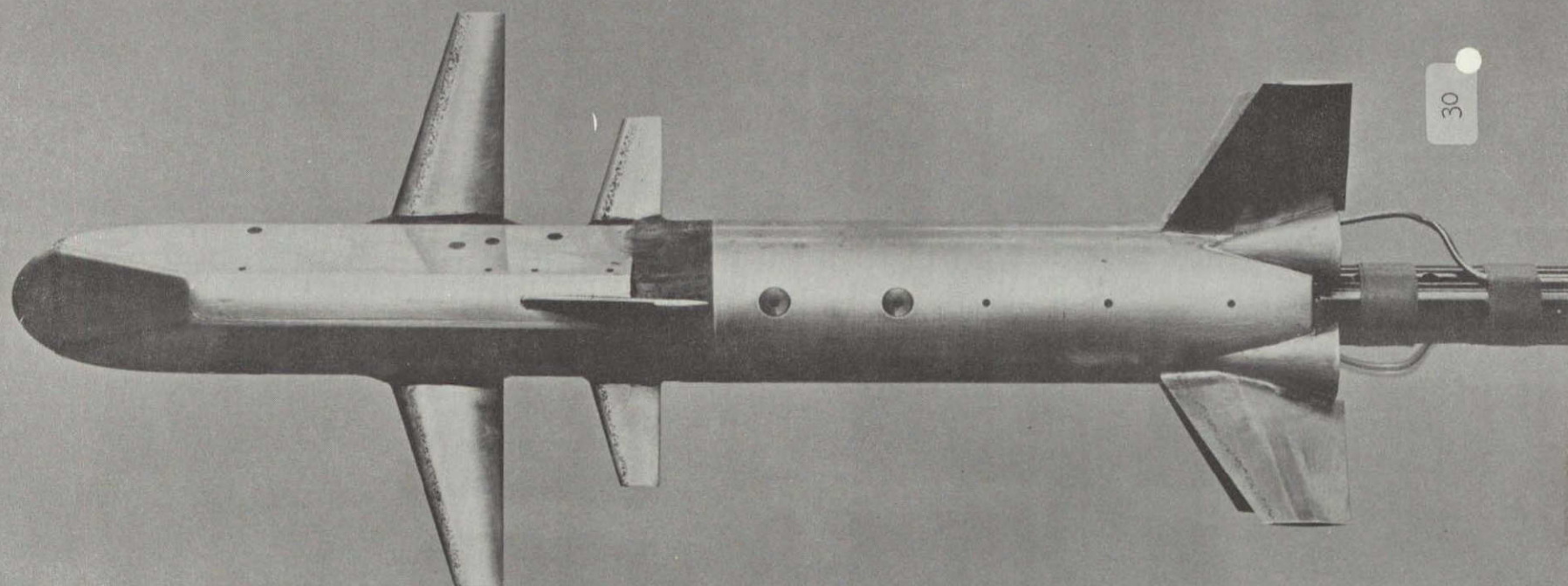


FIGURE 1(b). ¹SIDE VIEW OF MODEL WITH -2° ORBITER INCIDENCE



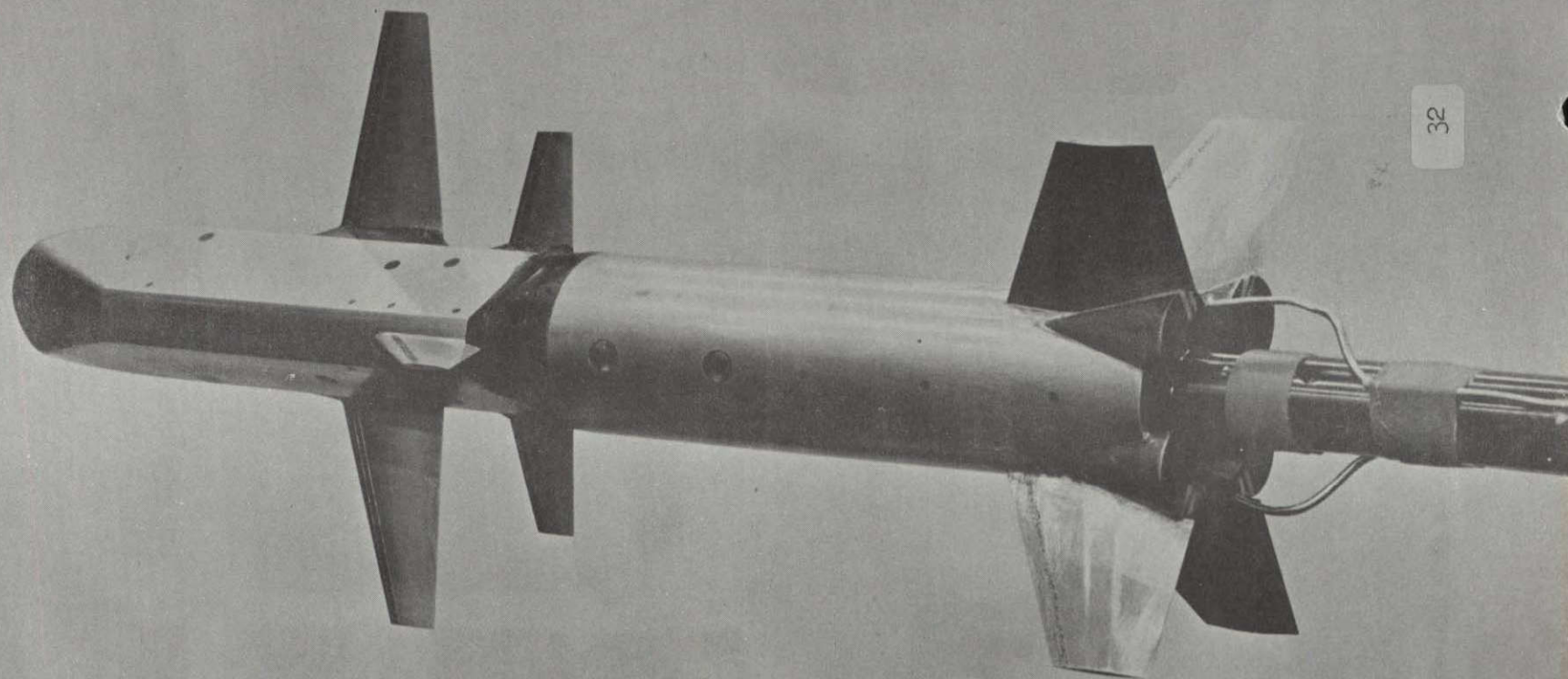
TWT 470 - 1.2
NOV 10 1970
CONF IG
BF, O WHVS

0	1	2

FIGURE 1(c). TOP VIEW OF MODEL SHOWING TRIP STRIP DETAILS



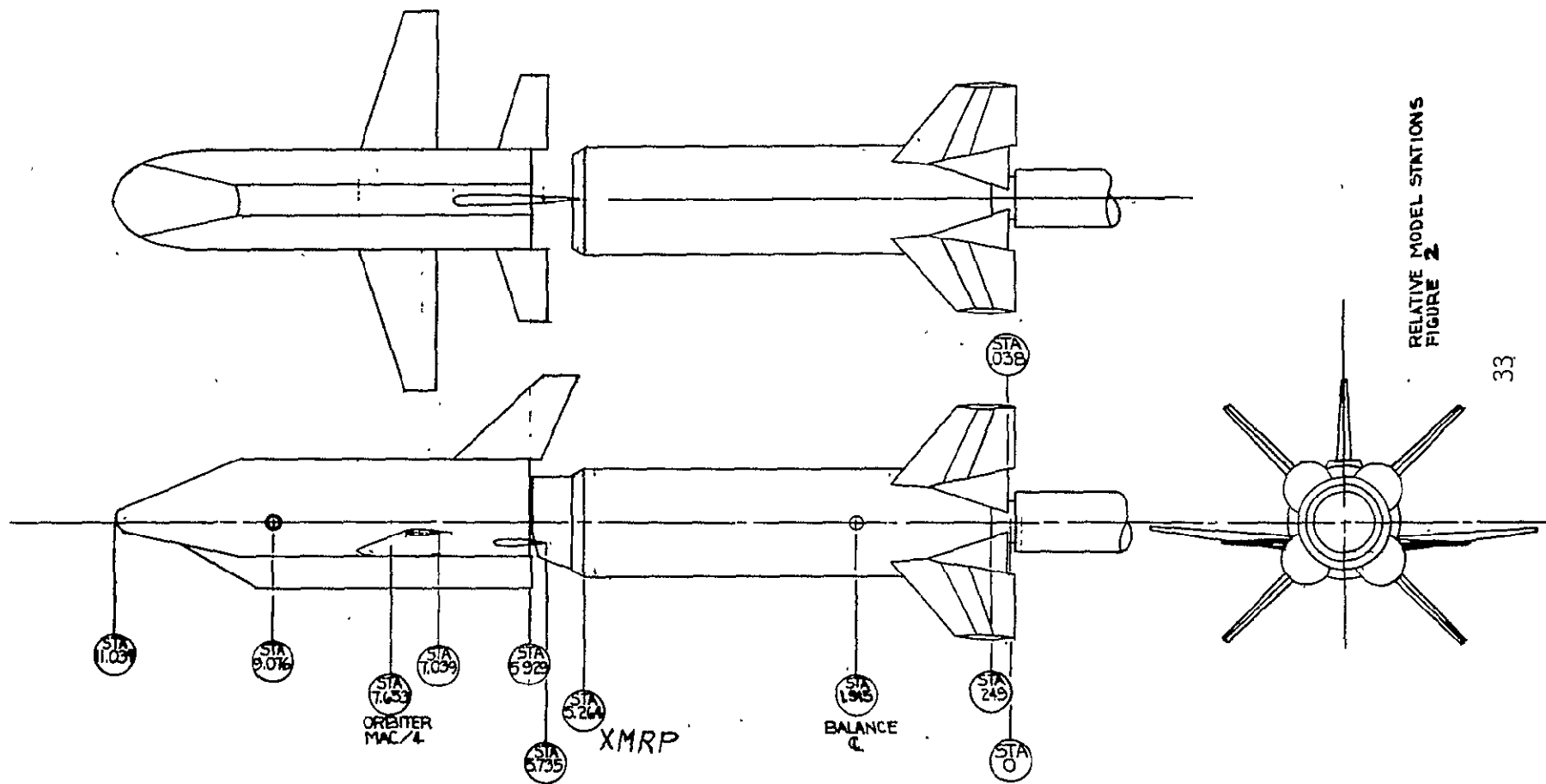
FIGURE 1(d). BOTTOM VIEW OF MODEL



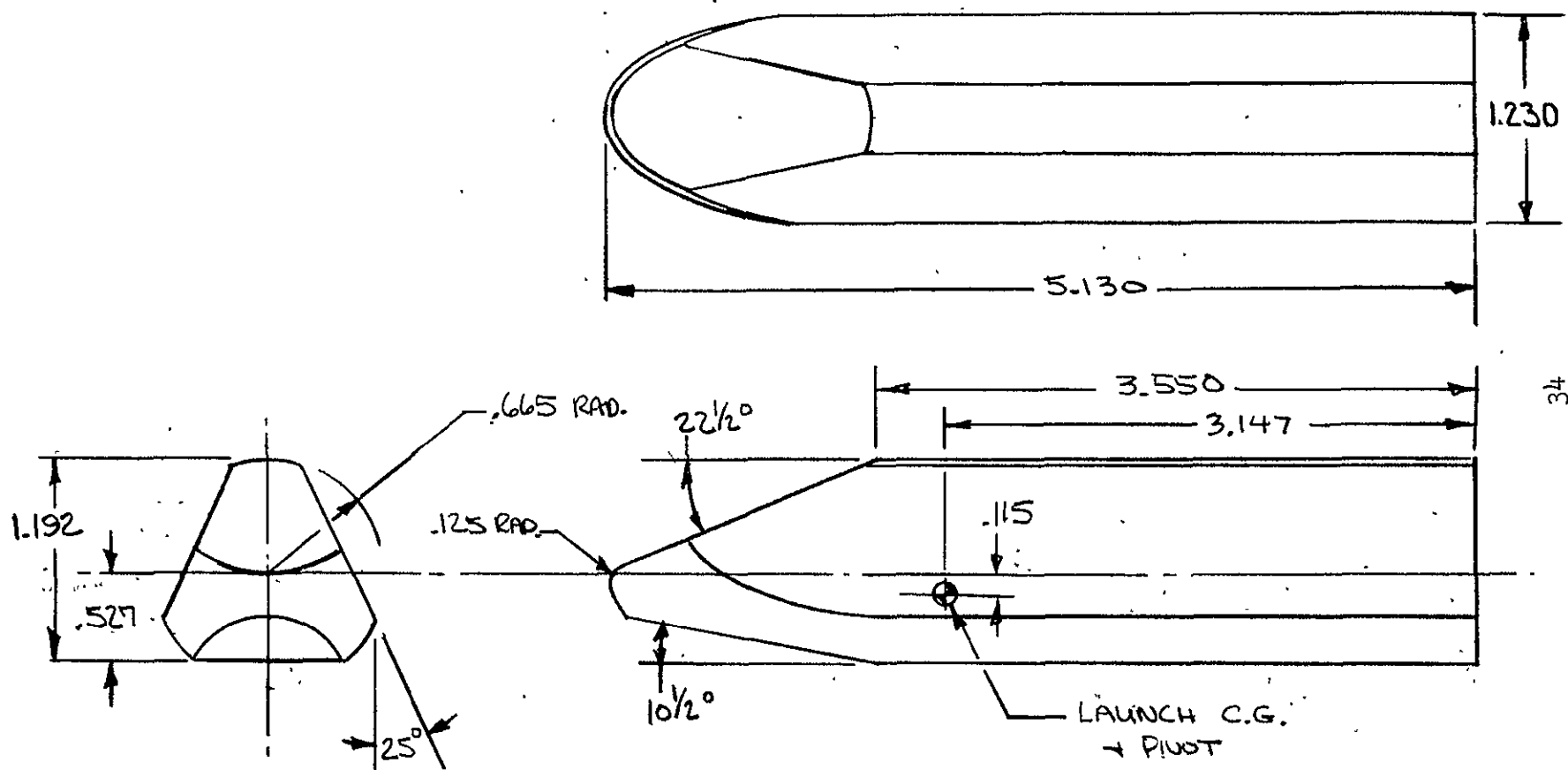
32

TWT 470 WITH
NOV 6 1970 GRIT
CONFIG
BF. 0 W HVS 0 1 2

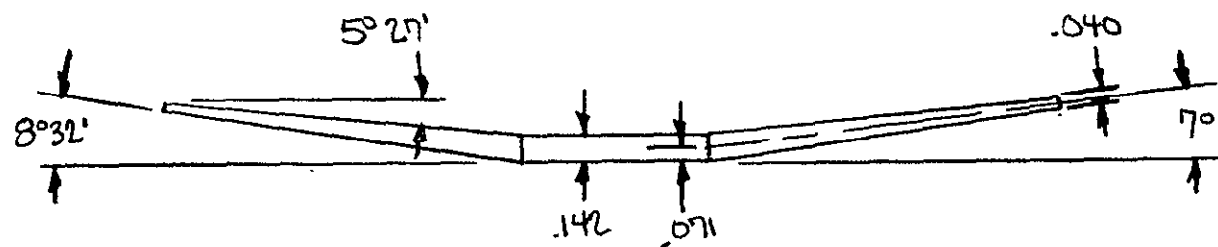
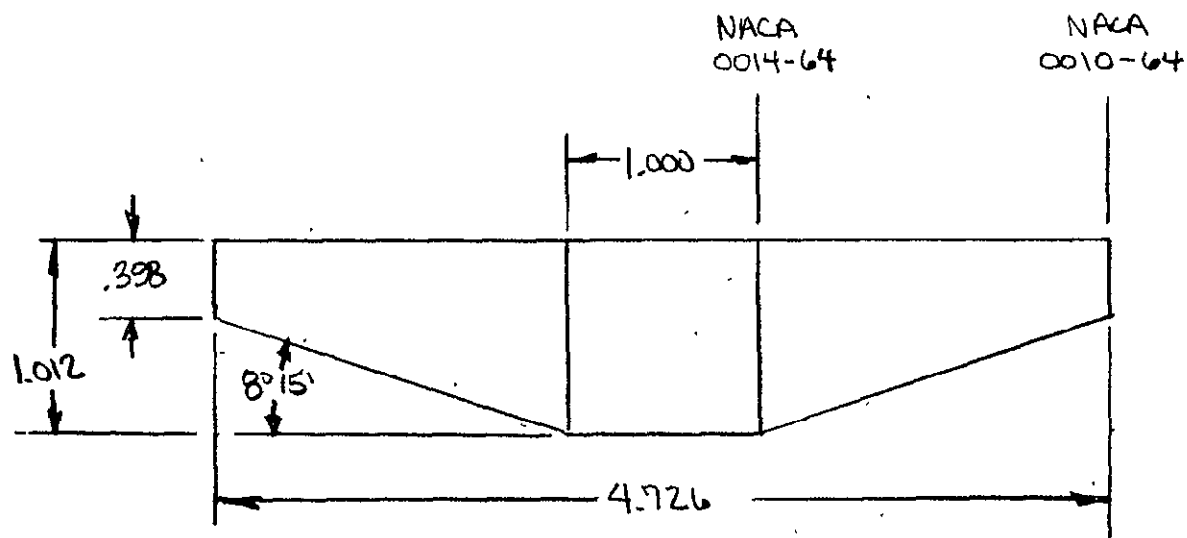
FIGURE 1(e). TOP REAR VIEW OF MODEL SHOWING BASE AREA DETAILS



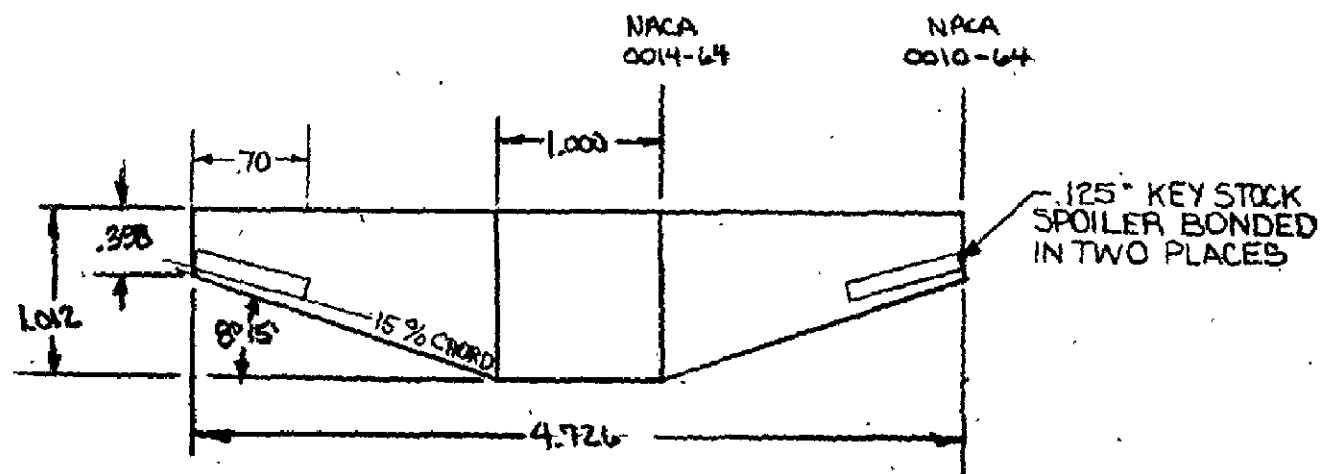
RELATIVE MODEL STATIONS
FIGURE 2



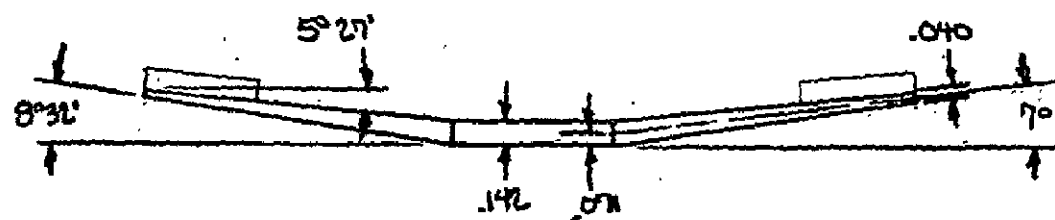
ORBITER BODY - 0
FIGURE 3



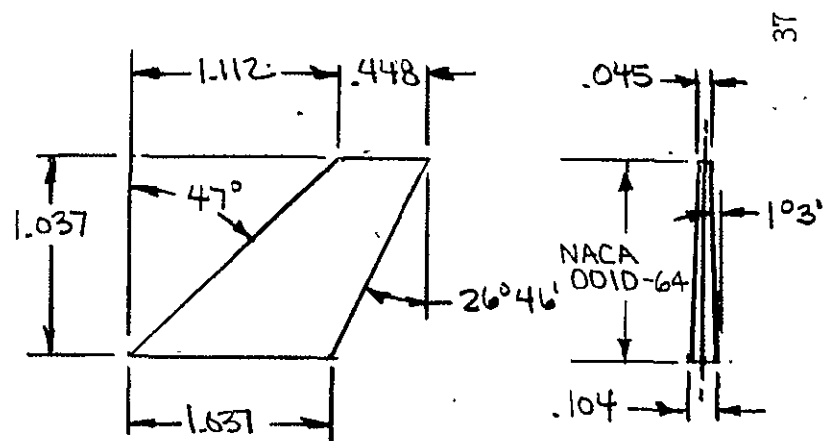
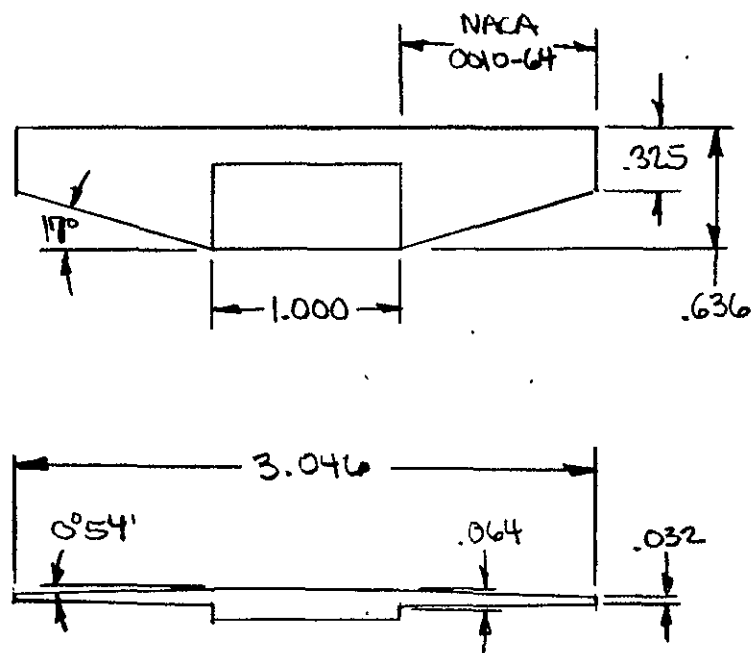
ORBITER WING - W
FIGURE 4



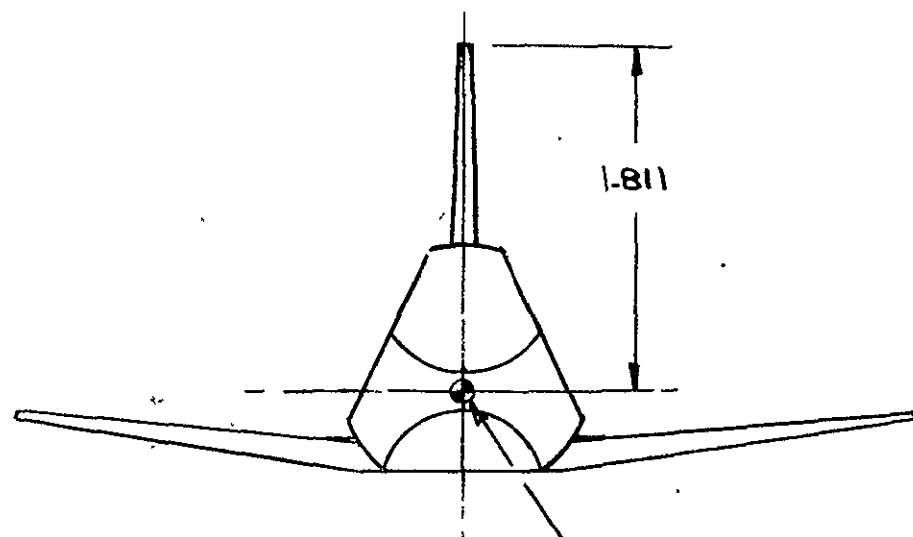
36



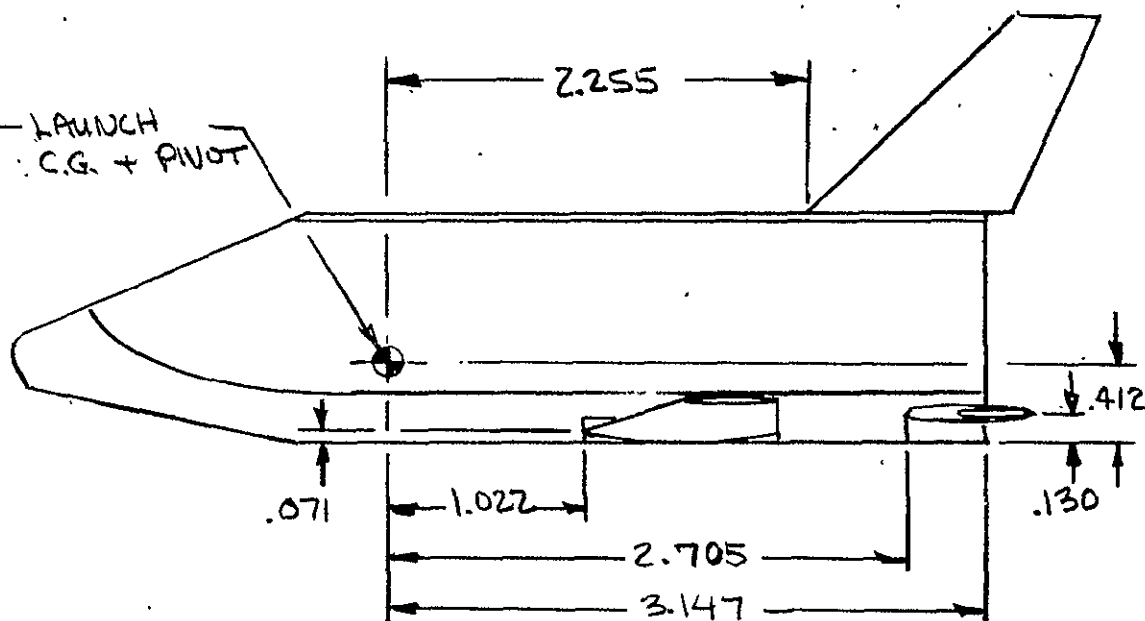
ORBITER WING WITH SPOILERS W₁
FIGURE 5



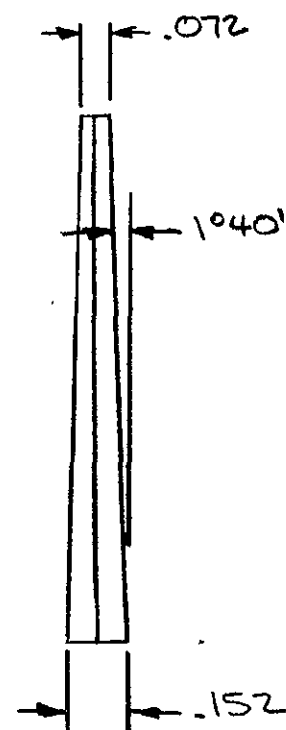
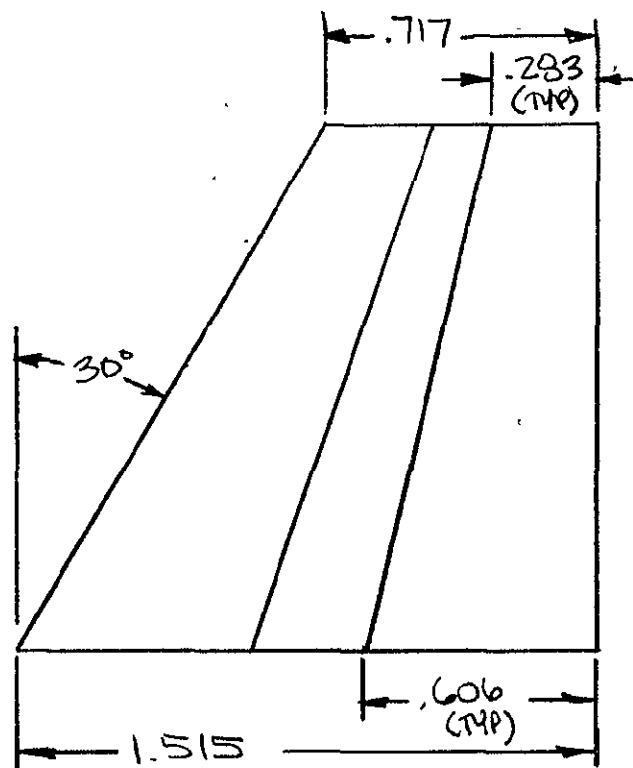
ORBITER HORIZONTAL TAIL H,
VERTICAL TAIL - V
FIGURE 6



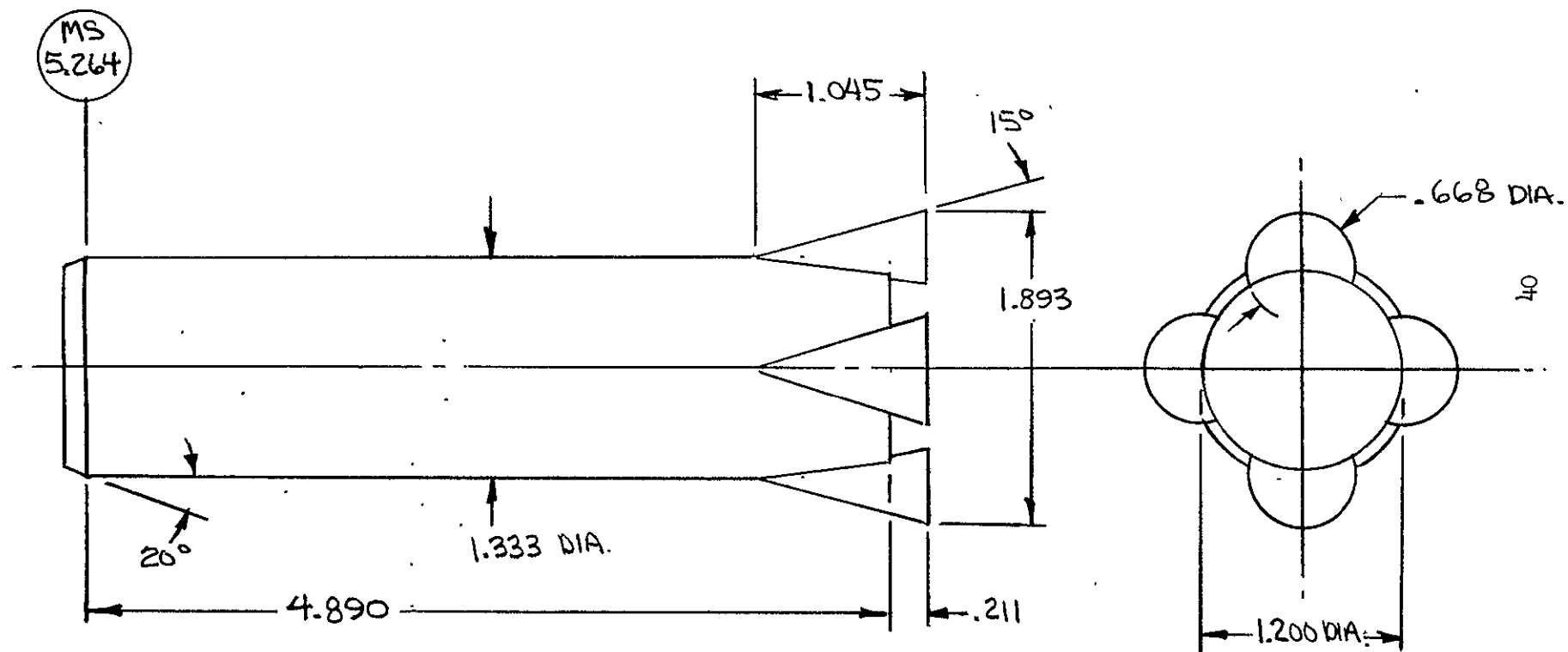
LAUNCH
C.G. + PIVOT



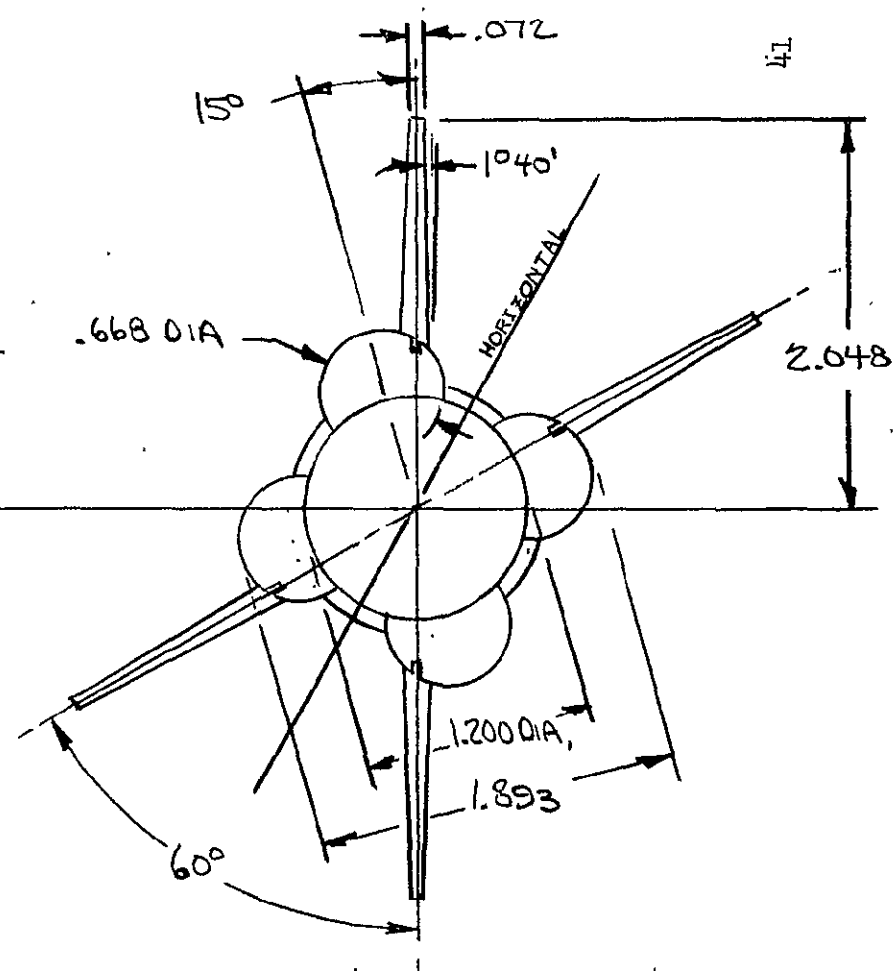
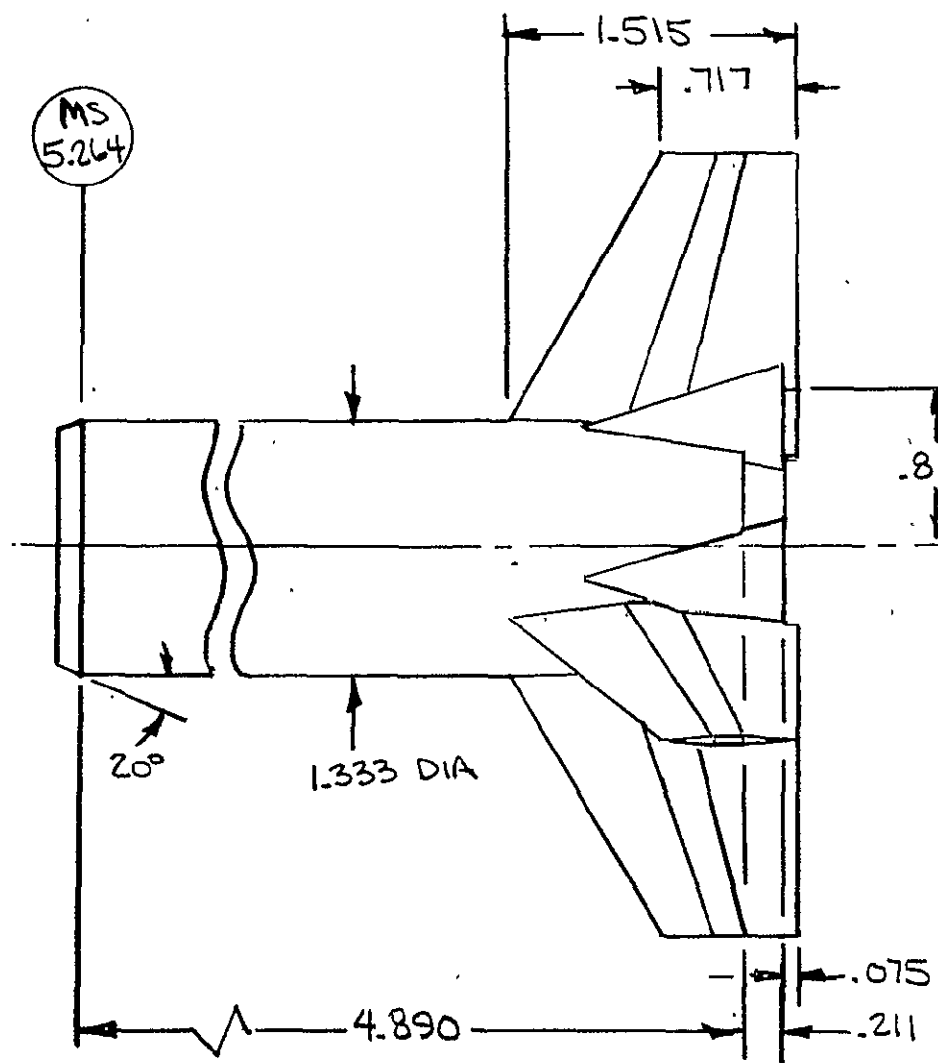
ORBITER ASSEMBLY - OWHV
FIGURE 7



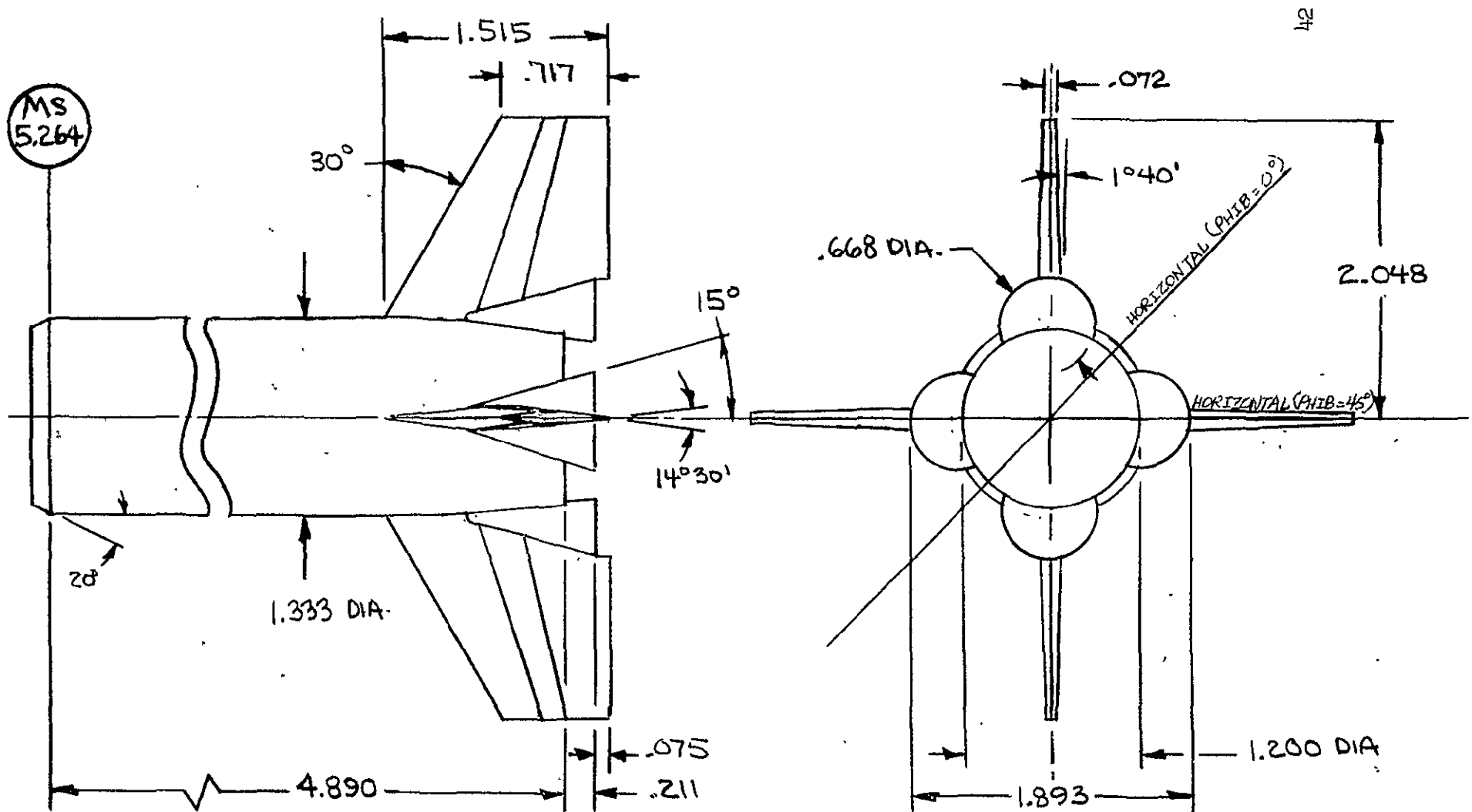
900 FT² S-IC FIN
FIGURE 8



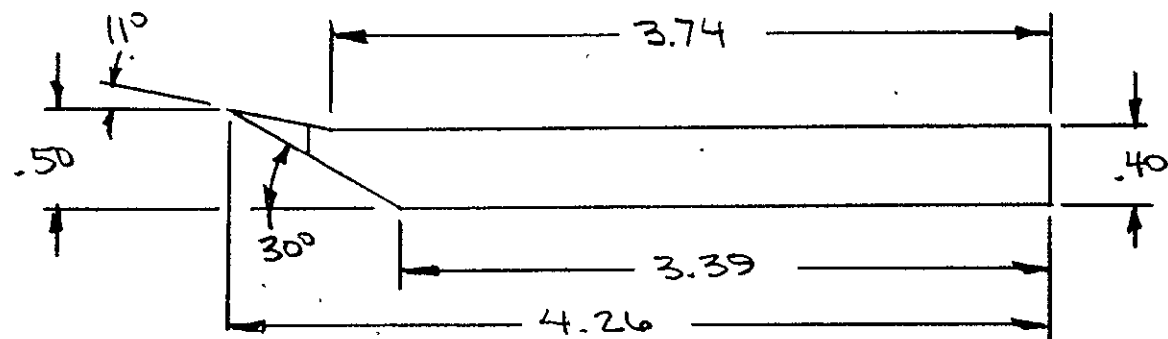
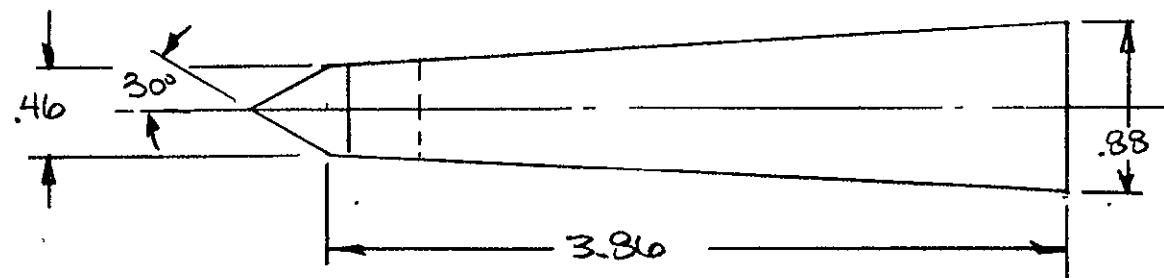
S-IC BODY - B
FIGURE 9



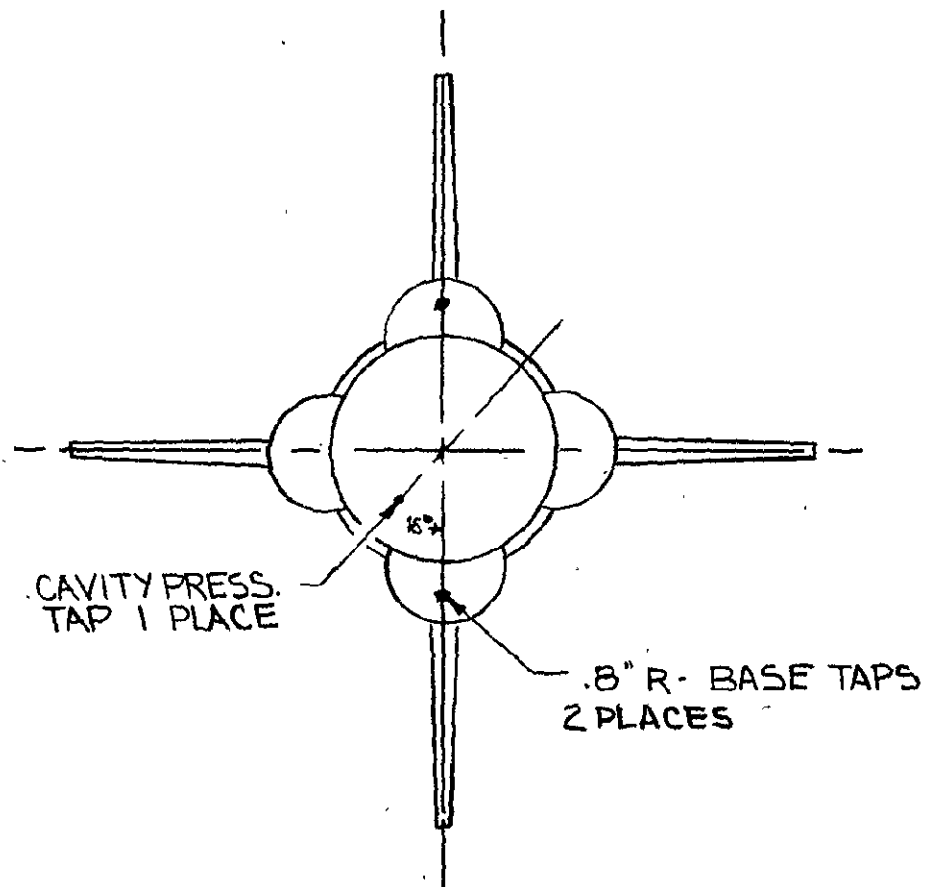
S-IC 300 FIN CONFIGURATION - F₁
FIGURE 10



S-IC 45° FIN CONFIGURATION - F₂
FIGURE 11



STRONGBACK - S
FIGURE 12



BASE PRESSURE TAP LOCATIONS
FIGURE 13

DATA PLOT INDEX

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=0.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24011	CN	ALPHA	1	1
J24011	CLM	ALPHA	2	2
J24011	CAF	ALPHA	3	3
J24021	CN	ALPHA	4	4
J24021	CLM	ALPHA	5	5
J24021	CAF	ALPHA	6	6

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-2.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24031	CN	ALPHA	7	7
J24031	CLM	ALPHA	8	8
J24031	CAF	ALPHA	9	9

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-4.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24041	CN	ALPHA	10	10
J24041	CLM	ALPHA	11	11
J24041	CAF	ALPHA	12	12

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=0.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24051	CN	ALPHA	13	13
J24051	CLM	ALPHA	14	14
J24051	CAF	ALPHA	15	15

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=-2.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24061	CN	ALPHA	16	16
J24061	CLM	ALPHA	17	17
J24061	CAF	ALPHA	18	18

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=-4.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24071	CN	ALPHA	19	19
J24071	CLM	ALPHA	20	20
J24071	CAF	ALPHA	21	21

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-1.05

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
A24081	CN	ALPHA	22	23
A24081	CLM	ALPHA	24	25
A24081	CAF	ALPHA	26	27

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, HTAIL=-5.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24091	CN	ALPHA	28	28
J24091	CLM	ALPHA	29	29
J24091	CAF	ALPHA	30	30

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING AND FINS OFF

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
A24101	CN	ALPHA	31	31
A24101	CLM	ALPHA	32	32
A24101	CAF	ALPHA	33	33

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING OFF

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
A24111	CN	ALPHA	34	34
A24111	CLM	ALPHA	35	35
A24111	CAF	ALPHA	36	36

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=45

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
A24121	CN	ALPHA	37	37
A24121	CLM	ALPHA	38	38
A24121	CAF	ALPHA	39	39

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
A24131	CN	ALPHA	40	40
A24131	CLM	ALPHA	41	41
A24131	CAF	ALPHA	42	42

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING INCIDENCE = 2.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
A24141	CN	ALPHA	43	43
A24141	CLM	ALPHA	44	44
A24141	CAF	ALPHA	45	45

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, STRONGBACK OFF

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
A24151	CN	ALPHA	46	46
A24151	CLM	ALPHA	47	47
A24151	CAF	ALPHA	48	48

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING SPOILERS

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
A24161	CN	ALPHA	49	50
A24161	CLM	ALPHA	51	52
A24161	CAF	ALPHA	53	54

MSFC TWT 470 LONGITUDINAL STABILITY, FINS ON, ORRINC=0.0

DEPENDENT VARIABLE VS DEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24011	CN	CLM	55	55
J24021	CN	CLM	56	56

MSFC TWT 470 LONGITUDINAL STABILITY, FINS ON, ORRINC=-2.0

DEPENDENT VARIABLE VS DEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24031	CN	CLM	57	57

MSFC TWT 470 LONGITUDINAL STABILITY, FINS ON, ORRINC=-4.0

DEPENDENT VARIABLE VS DEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24041	CN	CLM	58	58

MSFC TWT 470 LONGITUDINAL STABILITY, FINS OFF, ORRINC=0.0

DEPENDENT VARIABLE VS DEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24051	CN	CLM	59	59

MSFC TWT 470 LONGITUDINAL STABILITY, FINS OFF, ORBINC=-2.0

DEPENDENT VARIABLE VS DEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24061	CN	CLM	60	60

MSFC TWT 470 LONGITUDINAL STABILITY, FINS OFF, ORBINC=-4.0

DEPENDENT VARIABLE VS DEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24071	CN	CLM	61	61

MSFC TWT 470 LONGITUDINAL STABILITY, FINS ON, ORBINC=-1.05

DEPENDENT VARIABLE VS DEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
A24081	CN	CLM	62	63

MSFC TWT 470 LONGITUDINAL STABILITY, FINS ON, HTAIL=-5.0

DEPENDENT VARIABLE VS DEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24091	CN	CLM	64	64

MSFC TWT 470 LONGITUDINAL STABILITY, WING AND FINS OFF

DEPENDENT VARIABLE VS ~~DEPENDENT VARIABLE,~~

DATASETS PLOTTED	DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING
A24101	CN	CLM	65 65

MSFC TWT 470 LONGITUDINAL STABILITY, WING OFF

DEPENDENT VARIABLE VS ~~DEPENDENT VARIABLE,~~

DATASETS PLOTTED	DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING
A24111	CN	CLM	66 66

MSFC TWT 470 LONGITUDINAL STABILITY, CRUCIFORM FINS, PHIB=45

DEPENDENT VARIABLE VS ~~DEPENDENT VARIABLE,~~

DATASETS PLOTTED	DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING
A24121	CN	CLM	67 67

MSFC TWT 470 LONGITUDINAL STABILITY, CRUCIFORM FINS, PHIB=0

DEPENDENT VARIABLE VS ~~DEPENDENT VARIABLE,~~

DATASETS PLOTTED	DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING
A24131	CN	CLM	68 68

MSFC TWT 470 LONGITUDINAL STABILITY, WING INCIDENCE = 2.0

DEPENDENT VARIABLE VS DEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
A24141	CN	CLM	69	69

MSFC TWT 470 LONGITUDINAL STABILITY, STRONGBACK OFF

DEPENDENT VARIABLE VS DEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
A24151	CN	CLM	70	70

MSFC TWT 470 LONGITUDINAL STABILITY, WING SPOILERS

DEPENDENT VARIABLE VS DEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
A24161	CN	CLM	71	72

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=0.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24011	CPB1	ALPHA	73	73
J24011	CPB2	ALPHA	74	74
J24011	CPCAV	ALPHA	75	75
J24021	CPB1	ALPHA	76	76
J24021	CPB2	ALPHA	77	77
J24021	CPCAV	ALPHA	78	78

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-2.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24031	CPB1	ALPHA	79	79
J24031	CPB2	ALPHA	80	80
J24031	CPCAV	ALPHA	81	81

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-4.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24041	CPB1	ALPHA	82	82
J24041	CPB2	ALPHA	83	83
J24041	CPCAV	ALPHA	84	84

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=0.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24051	CPB1	ALPHA	85	85
J24051	CPB2	ALPHA	86	86
J24051	CPCAV	ALPHA	87	87

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=-2.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24061	CPB1	ALPHA	88	88
J24061	CPB2	ALPHA	89	89
J24061	CPCAV	ALPHA	90	90

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=-4.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24071	CPB1	ALPHA	91	91
J24071	CPB2	ALPHA	92	92
J24071	CPCAV	ALPHA	93	93

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=1.05

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
A24081	CPB1	ALPHA	94	95
A24081	CPB2	ALPHA	96	97
A24081	CPCAV	ALPHA	98	99

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, HTAIL=-5.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24091	CPB1	ALPHA	100	100
J24091	CPB2	ALPHA	101	101
J24091	CPCAV	ALPHA	102	102

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING AND FINS OFF

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
A24101	CPB1	ALPHA	103	103
A24101	CPB2	ALPHA	104	104
A24101	CPCAV	ALPHA	105	105

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING OFF

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
A24111	CPB1	ALPHA	106	106
A24111	CPB2	ALPHA	107	107
A24111	CPCAV	ALPHA	108	108

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=45

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
A24121	CPB1	ALPHA	109	109
A24121	CPB2	ALPHA	110	110
A24121	CPCAV	ALPHA	111	111

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
A24131	CPB1	ALPHA	112	112
A24131	CPB2	ALPHA	113	113
A24131	CPCAV	ALPHA	114	114

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING INCIDENCE = 2.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE:

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
A24141	CPB1	ALPHA	115	115
A24141	CPB2	ALPHA	116	116
A24141	CPCAV	ALPHA	117	117

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, STRONGBACK OFF

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE:

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
A24151	CPB1	ALPHA	118	118
A24151	CPB2	ALPHA	119	119
A24151	CPCAV	ALPHA	120	120

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING SPOILERS

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE:

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
A24161	CPB1	ALPHA	121	122
A24161	CPB2	ALPHA	123	124
A24161	CPCAV	ALPHA	125	126

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS ON, ORBINC=0.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
H24011	CN	MACH	127	127
H24011	CLM	MACH	128	128
H24011	CAF	MACH	129	129
H24021	CN	MACH	130	130
H24021	CLM	MACH	131	131
H24021	CAF	MACH	132	132

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS ON, ORBINC=-2.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
H24031	CN	MACH	133	133
H24031	CLM	MACH	134	134
H24031	CAF	MACH	135	135

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS ON, ORBINC=-4.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
H24041	CN	MACH	136	136
H24041	CLM	MACH	137	137
H24041	CAF	MACH	138	138

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS OFF, ORBINC=0.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE.

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
H24051	CN	MACH	139	139
H24051	CLM	MACH	140	140
H24051	CAF	MACH	141	141

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS OFF, ORBINC=-2.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE.

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
H24061	CN	MACH	142	142
H24061	CLM	MACH	143	143
H24061	CAF	MACH	144	144

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS OFF, ORBINC=4.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE.

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
H24071	CN	MACH	145	145
H24071	CLM	MACH	146	146
H24071	CAF	MACH	147	147

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS ON, ORBINC=-1.05

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
H24081	CN	MACH	148	148
H24081	CLM	MACH	149	149
H24081	CAF	MACH	150	150

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS ON, HTAIL=-5.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
H24091	CN	MACH	151	151
H24091	CLM	MACH	152	152
H24091	CAF	MACH	153	153

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, WING AND FINS OFF

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
H24101	CN	MACH	154	154
H24101	CLM	MACH	155	155
H24101	CAF	MACH	156	156

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, WING OFF

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
H24111	CN	MACH	157	157
H24111	CLM	MACH	158	158
H24111	CAF	MACH	159	159

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, CRUCIFORM FINS, PHIB=45

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
H24121	CN	MACH	160	160
H24121	CLM	MACH	161	161
H24121	CAF	MACH	162	162

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, CRUCIFORM FINS, PHIB=0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
H24131	CN	MACH	163	163
H24131	CLM	MACH	164	164
H24131	CAF	MACH	165	165

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, WING INCIDENCE = 2.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
H24141	CN	MACH	166	166
H24141	CLM	MACH	167	167
H24141	CAF	MACH	168	168

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, STRONGBACK OFF

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
H24151	CN	MACH	169	169
H24151	CLM	MACH	170	170
H24151	CAF	MACH	171	171

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, WING SPOILERS

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
H24161	CN	MACH	172	172
H24161	CLM	MACH	173	173
H24161	CAF	MACH	174	174

MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS ON, ORBINC=0.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24011	CN	MACH	175
V24011	CLM	MACH	176
V24021	CN	MACH	177
V24021	CLM	MACH	178

MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS ON, ORBINC=-2.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24031	CN	MACH	179
V24031	CLM	MACH	180

MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS ON, ORBINC=-4.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24041	CN	MACH	181
V24041	CLM	MACH	182

MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS OFF, ORBINC=0.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24051	CN	MACH	183
V24051	CLM	MACH	184

MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS OFF, ORBINC=-2.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24061	CN	MACH	185
V24061	CLM	MACH	186

MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS OFF, ORBINC=-4.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24071	CN	MACH	187
V24071	CLM	MACH	188

MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS ON, ORBINC=-1.05

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24081	CN	MACH	189
V24081	CLM	MACH	190

MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS ON, HTAIL=-5.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24091	CN	MACH	191
V24091	CLM	MACH	192

MSFC TWT 470 LONGITUDINAL DERIVATIVES, WING AND FINS OFF

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24101	CN	MACH	193
V24101	CLM	MACH	194

MSFC TWT 470 LONGITUDINAL DERIVATIVES, WING OFF

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24111	CN	MACH	195
V24111	CLM	MACH	196

MSFC TWT 470 LONGITUDINAL DERIVATIVES, CRUCIFORM FINS, PHIB=45

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24121	CN	MACH	197
V24121	CLM	MACH	198

MSFC TWT 470 LONGITUDINAL DERIVATIVES, CRUCIFORM FINS, PHIB=0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24131	CN	MACH	199
V24131	CLM	MACH	200

MSFC TWT 470 LONGITUDINAL DERIVATIVES, WING INCIDENCE = 2.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24141	CN	MACH	201
V24141	CLM	MACH	202

MSFC TWT 470 LONGITUDINAL DERIVATIVES, STRONGBACK OFF

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24151	CN	MACH	203
V24151	CLM	MACH	204

MSFC TWT 470 LONGITUDINAL DERIVATIVES, WING SPOILERS

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24161	CN	MACH	205
V24161	CLM	MACH	206

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, FINS ON, ORBINC=0.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24011	CLM/CN	MACH	207
V24021	CLM/CN	MACH	208

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, FINS ON, ORBINC=-2.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24031	CLM/CN	MACH	209

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, FINS ON, ORBINC=-4.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24041	CLM/CN	MACH	210

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, FINS OFF, ORBINC=0.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24051	CLM/CN	MACH	211

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, FINS OFF, ORBINC=-2.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24061	CLM/CN	MACH	212

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, FINS OFF, ORBINC=-4.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24071	CLM/CN	MACH	213

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, FINS ON, ORBINC=-1.05

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24081	CLM/CN	MACH	214

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, FINS ON, HTAIL=-5.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24091	CLM/CN	MACH	215

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, WING AND FINS OFF

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24101	CLM/CN	MACH	216

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, WING OFF

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24111	CLM/CN	MACH	217

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, CRUCIFORM FINS, PHIB=45

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24121	CLM/CN	MACH	218

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, CRUCIFORM FINS, PHIB=0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24131	CLM/CN	MACH	219

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, WING INCIDENCE = 2.0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24141	CLM/CN	MACH	220

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, STRONGBACK OFF

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24151	CLM/CN	MACH	221

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, WING SPOILERS

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24161	CLM/CN	MACH	222

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE, MULTIPLE DATASETS

DATASETS PLOTTED:

X24081 A24101 X24111 X24151

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
CN	ALPHA	223	223

DATASETS PLOTTED:

B24081 B24111 B24151

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
CN	ALPHA	224	226

DATASETS PLOTTED:

X24081 A24101 X24111 X24151

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
CLM	ALPHA	227	227

DATASETS PLOTTED:

B24081 B24111 B24151

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
CLM	ALPHA	228	230

DATASETS PLOTTED:

X24081 A24101 X24111 X24151

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
CAF	ALPHA	231	231

DATASETS PLOTTED:

B24081 B24111 B24151

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
CAF	ALPHA	232	234

MSFC TWT 470 MODEL BUILDUP

DEPENDENT VARIABLE VS DEPENDENT VARIABLE, MULTIPLE DATASETS

DATASETS PLOTTED:

X24081 A24101 X24111 X24151

DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
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CN	CLM	235	235
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DATASETS PLOTTED:

B24081 B24111 B24151

DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
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CN	CLM	236	238
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MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE, PARAMETRIC STUDY

DATASETS PLOTTED:

A24041 A24031 A24021

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
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CN	ALPHA	239	245
CLM	ALPHA	246	252

DATASETS PLOTTED:

A24071 A24061 A24051

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
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CN	ALPHA	253	259
CLM	ALPHA	260	266

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

DEPENDENT VARIABLE VS DEPENDENT VARIABLE, PARAMETRIC STUDY

DATASETS PLOTTED:

A24041 A24031 A24021

DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
CN	CLM	267	273

DATASETS PLOTTED:

A24071 A24061 A24051

DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
CN	CLM	274	280

MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE, PARAMETRIC STUDY

DATASETS PLOTTED:

A24091 C24081

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
CN	ALPHA	281	287
CLM	ALPHA	288	294
CAF	ALPHA	295	301

MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE

DEPENDENT VARIABLE VS DEPENDENT VARIABLE, PARAMETRIC STUDY

DATASETS PLOTTED:

A24091 C24081

DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
CN	CLM	302	308

MSFC TWT 470 HORIZONTAL TAIL EFFECTIVENESS

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
P24081	CNIHO	MACH	309	309
P24081	CMHO	MACH	310	310

MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE, MULTIPLE DATASETS

DATASETS PLOTTED:

D24081 D24161

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
CN	ALPHA	311	312

DATASETS PLOTTED:

E24081 E24141 E24111 E24161

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
CN	ALPHA	313	315

DATASETS PLOTTED:

F24081 F24161

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
CN	ALPHA	316	316

DATASETS PLOTTED:

G24081 G24141 G24111 G24161

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
CN	ALPHA	317	317

DATASETS PLOTTED:

S24081 S24161

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
CN	ALPHA	318	318

DATASETS PLOTTED:

D24081 D24161

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
CLM	ALPHA	319	320

MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE, MULTIPLE DATASETS

DATASETS PLOTTED:

E24081 E24141 E24111 E24161

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
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CLM	ALPHA	321	323
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DATASETS PLOTTED:

F24081 F24161

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
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CLM	ALPHA	324	324
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DATASETS PLOTTED:

G24081 G24141 G24111 G24161

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
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CLM	ALPHA	325	325
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DATASETS PLOTTED:

S24081 S24161

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
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CLM	ALPHA	326	326
-----	-------	-----	-----

MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS

DEPENDENT VARIABLE VS DEPENDENT VARIABLE, MULTIPLE DATASETS

DATASETS PLOTTED:

D24081 D24161

DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
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CN	CLM	327	328
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DATASETS PLOTTED:

E24081 E24141 E24111 E24161

DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
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CN	CLM	329	331
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DATASETS PLOTTED:

F24081 F24161

DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
-----------------------	-----------------------	---------------------------------	--

CN	CLM	332	332
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DATASETS PLOTTED:

G24081 G24141 G24111 G24161

DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
-----------------------	-----------------------	---------------------------------	--

CN	CLM	333	333
----	-----	-----	-----

DATASETS PLOTTED:

S24081 S24161

DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
-----------------------	-----------------------	---------------------------------	--

CN	CLM	334	334
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MSFC TWT 470 EFFECTS OF FIN ORIENTATION

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE, MULTIPLE DATASETS

DATASETS PLOTTED:

T24081 A24121 A24131

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
CN	ALPHA	335	338
CLM	ALPHA	339	342

MSFC TWT 470 LATERAL-DIRECTIONAL CHARACTERISTICS, BASIC CONFIGURATION

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
A24082	CY	BETA	343	344
A24082	CYN	BETA	345	346
A24082	CBL	BETA	347	348

MSFC TWT 470 LATERAL-DIRECTIONAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24132	CY	BETA	349	349
J24132	CYN	BETA	350	350
J24132	CBL	BETA	351	351

MSFC TWT 470 DIRECTIONAL STABILITY, BASIC CONFIGURATION

DEPENDENT VARIABLE VS DEPENDENT VARIABLE, (FSDVAR)

DATASETS PLOTTED	DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
A24082	CY	CYN	352	353

MSFC TWT 470 DIRECTIONAL STABILITY, CRUCIFORM FINS, PHIB=0

DEPENDENT VARIABLE VS DEPENDENT VARIABLE, (FSDVAR)

DATASETS PLOTTED	DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24132	CY	CYN	354	354

MSFC TWT 470 LATERAL-DIRECTIONAL CHARACTERISTICS, BASIC CONFIGURATION

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE, (FSALFA)

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
A24082	CPB1	BETA	355	356
A24082	CPB2	BETA	357	358
A24082	CPCAV	BETA	359	360

MSFC TWT 470 LATERAL-DIRECTIONAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASETS PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
J24132	CPB1	BETA	361	361
J24132	CPB2	BETA	362	362
J24132	CPCAV	BETA	363	363

MSFC TWT 470 LATERAL-DIRECTIONAL DERIVATIVES, BASIC CONFIGURATION

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
J24082	CY	MACH	364
J24082	CYN	MACH	365
J24082	CBL	MACH	366

MSFC TWT 470 LATERAL-DIRECTIONAL DERIVATIVES, CRUCIFORM FINS, PHIB=0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
J24132	CY	MACH	367
J24132	CYN	MACH	368
J24132	CBL	MACH	369

MSFC TWT 470 DIRECTIONAL AERODYNAMIC CENTER, BASIC CONFIGURATION

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24082	CYN/CY	MACH	370

MSFC TWT 470 DIRECTIONAL AERODYNAMIC CENTER, CRUCIFORM FINS, PHIB=0

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE,

DATASET PLOTTED	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE
V24132	CYN/CY	MACH	371

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS

DEPENDENT VARIABLE VS INDEPENDENT VARIABLE, MULTIPLE DATASETS

DATASETS PLOTTED:

A24132 J24082

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
CY	BETA	372	378
CYN	BETA	379	385
CBL	BETA	386	392

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS

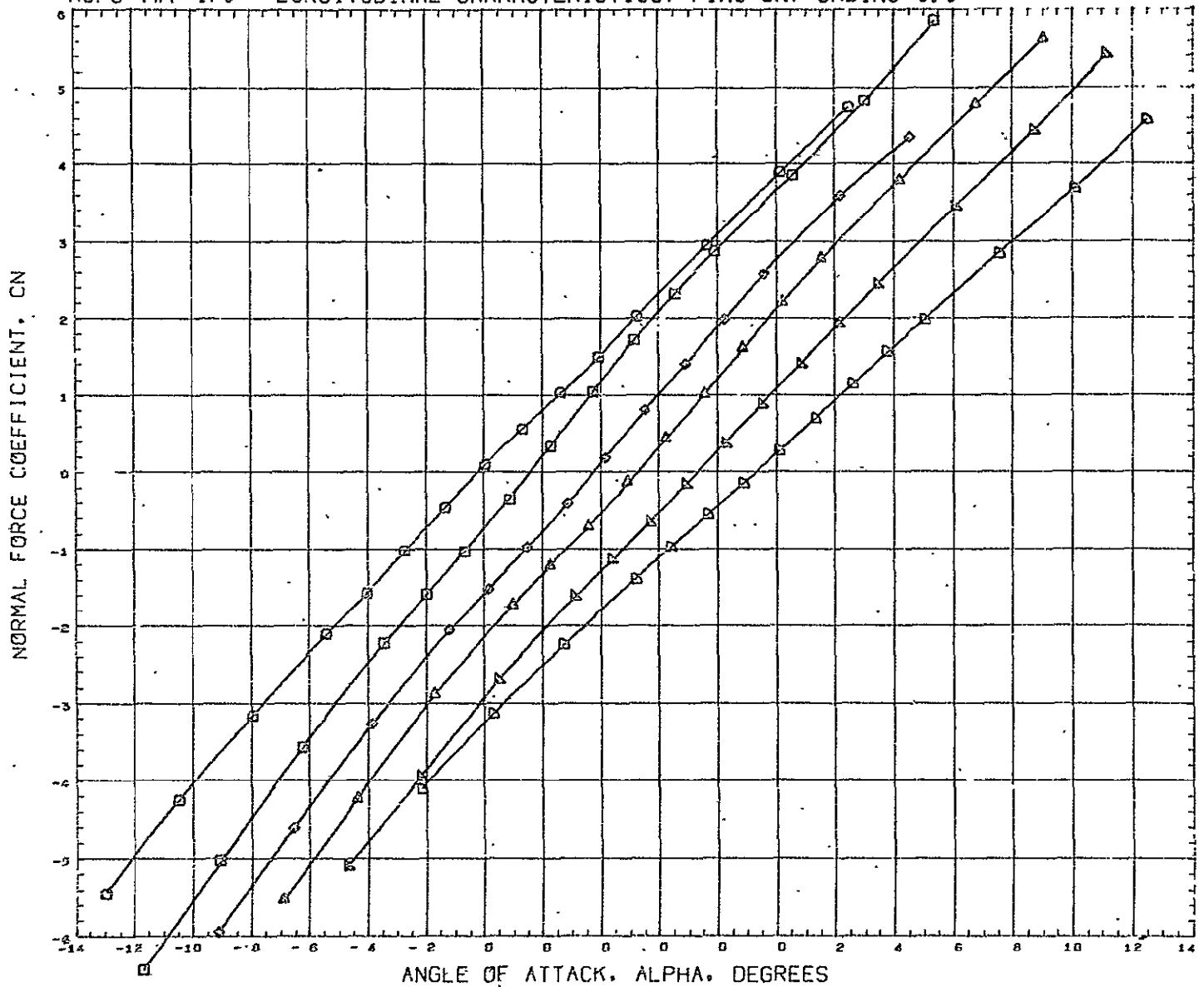
DEPENDENT VARIABLE VS DEPENDENT VARIABLE, MULTIPLE DATASETS

DATASETS PLOTTED:

A24132 J24082

DEPENDENT VARIABLE	DEPENDENT VARIABLE	PLOT PAGE BEGINNING / ENDING	
CY	CYN	393	399

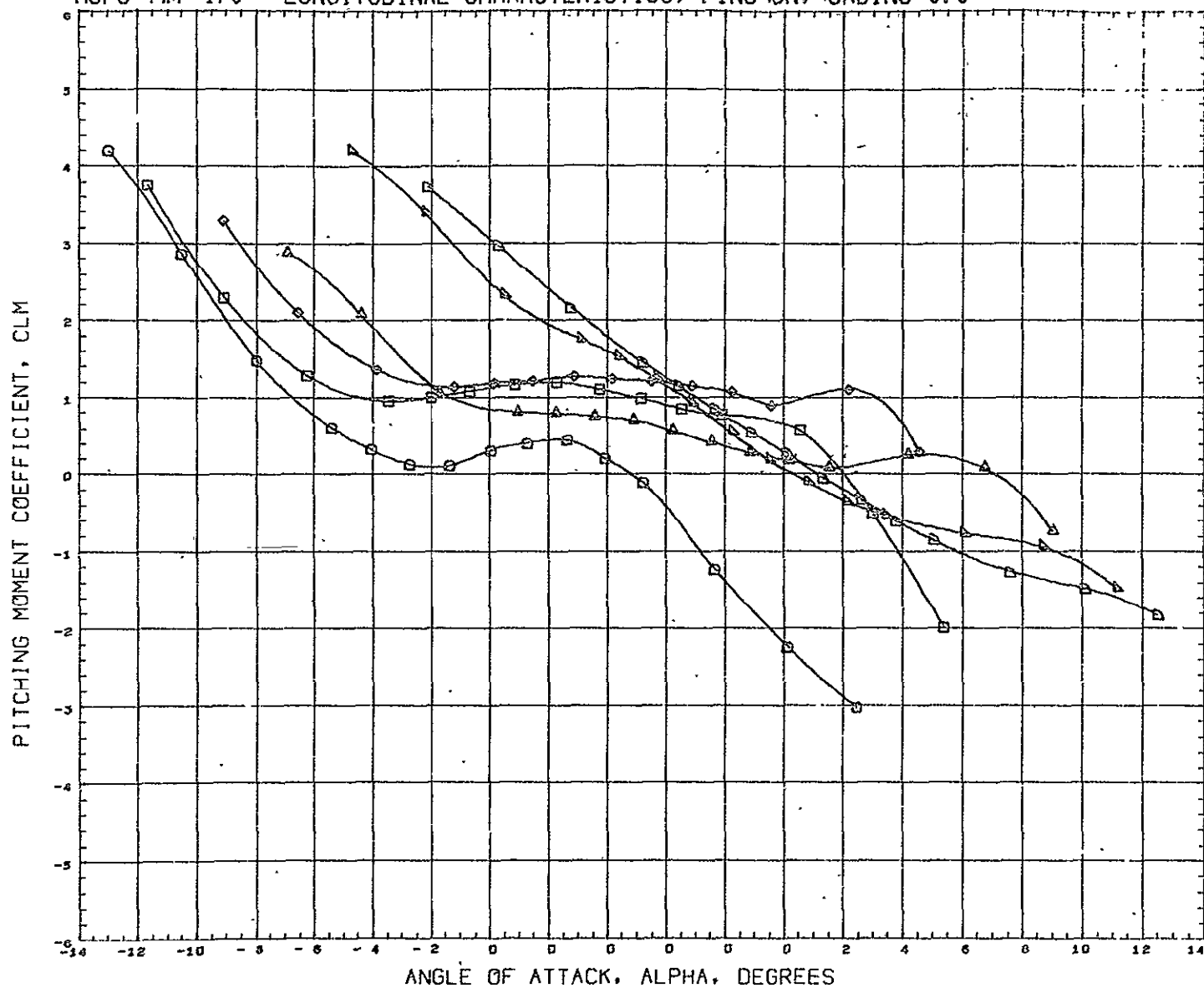
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=0.0



SYMBOL	NACH	PARAMETRIC VALUES			
○	0.900	BETA	- 0.070	ORBINC	0.000
□	1.002	WNGINC	4.000	HTAIL	0.000
◇	1.105	FHIB	0.000		
△	1.297				
▽	1.461				
◻	1.904	DATA HIST. CODE	NA		

REFERENCE INFORMATION		
REFS	1.3960	50. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
YMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

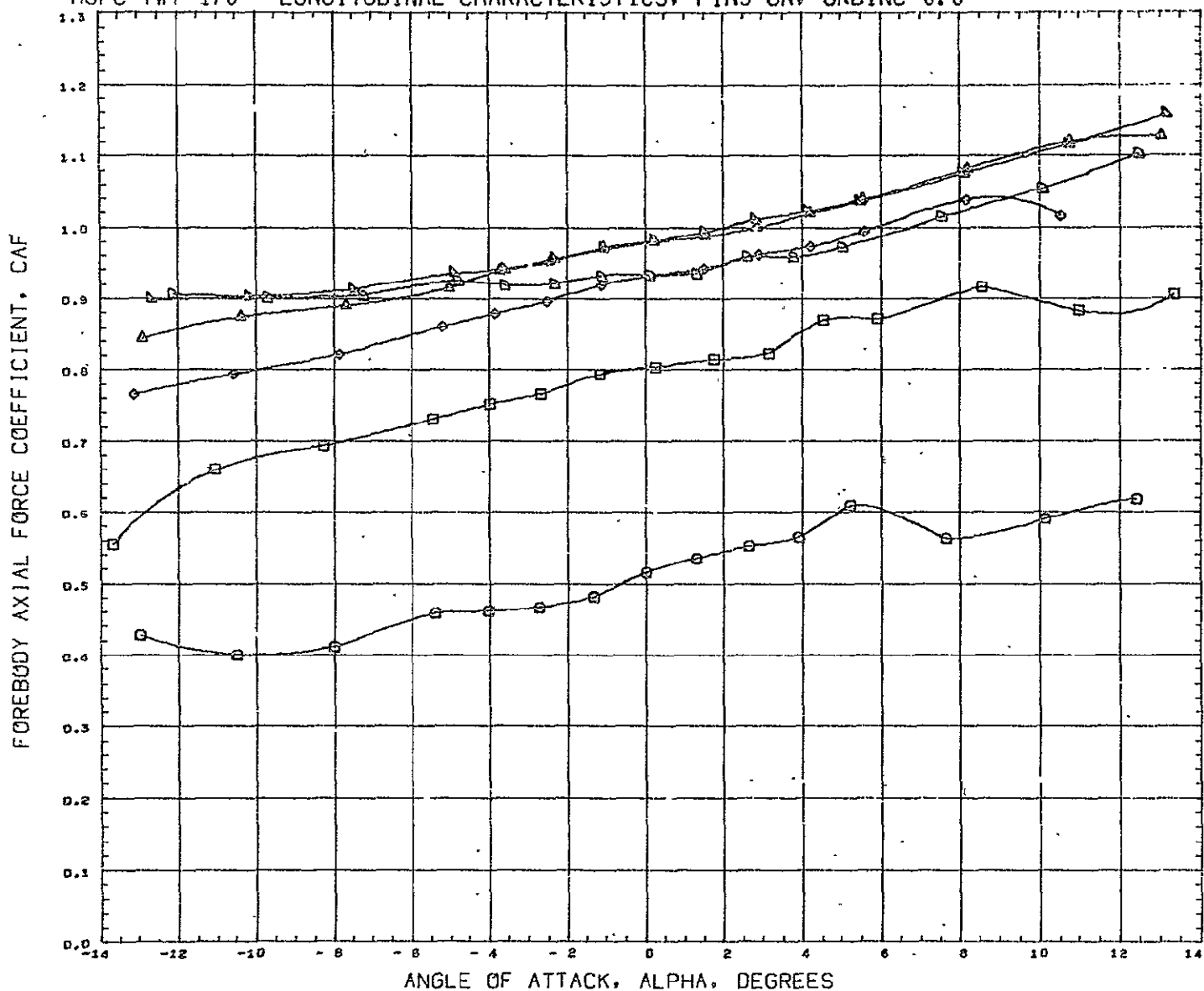
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=0.0



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.900	BETA	-0.070	ORBINC	0.000
□	1.002	WINGINC	4.000	HTAIL	0.000
◇	1.103	PHIB	0.000		
△	1.197				
▽	1.461				
◻	1.954	DATA MIST. CODE	#A		

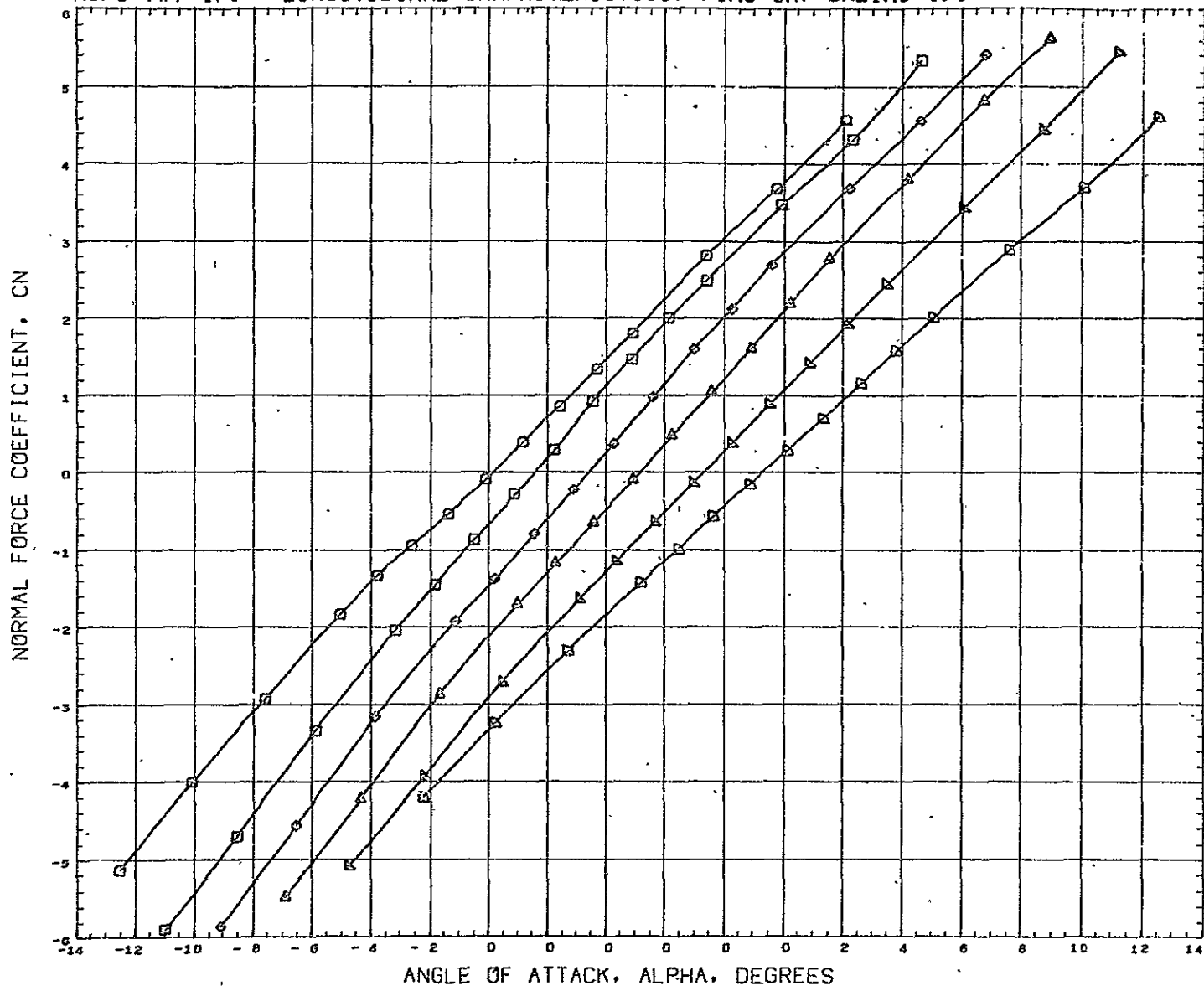
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REFS	1.3960	90. IN.
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REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=0.0



SYMBOL	MACH	PARAMETRIC VALUES				REFERENCE INFORMATION	
□	0.900	BETA	-0.070	ORBINC.	0.000	REFS	1.3960 SQ.IN.
□	1.002	WINGINC	4.000	HTAIL	0.000	REFL	1.3330 INCHES
◇	1.105	PHIB	0.000			REFB	1.3330 INCHES
△	1.197					XMRP	5.2640 INCHES
△	1.461					YMRP	0.0000 INCHES
△	1.461					ZMRP	0.0000 INCHES
△	1.964	DATA HIST. CODE	*A			SCALE	0.3366 PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=0.0



SYMBOL	MACH	PARAMETRIC VALUES			
□	0.903	BETA	-0.090	ORBINC	0.000
□	1.001	WINGINC	4.000	HTAIL	0.000
◇	1.101	FHIB	0.000		
△	1.202				
▽	1.450				
⬢	1.965	DATA HIST. CODE	*A		

REFERENCE INFORMATION		
REFS	1.3960	SG. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

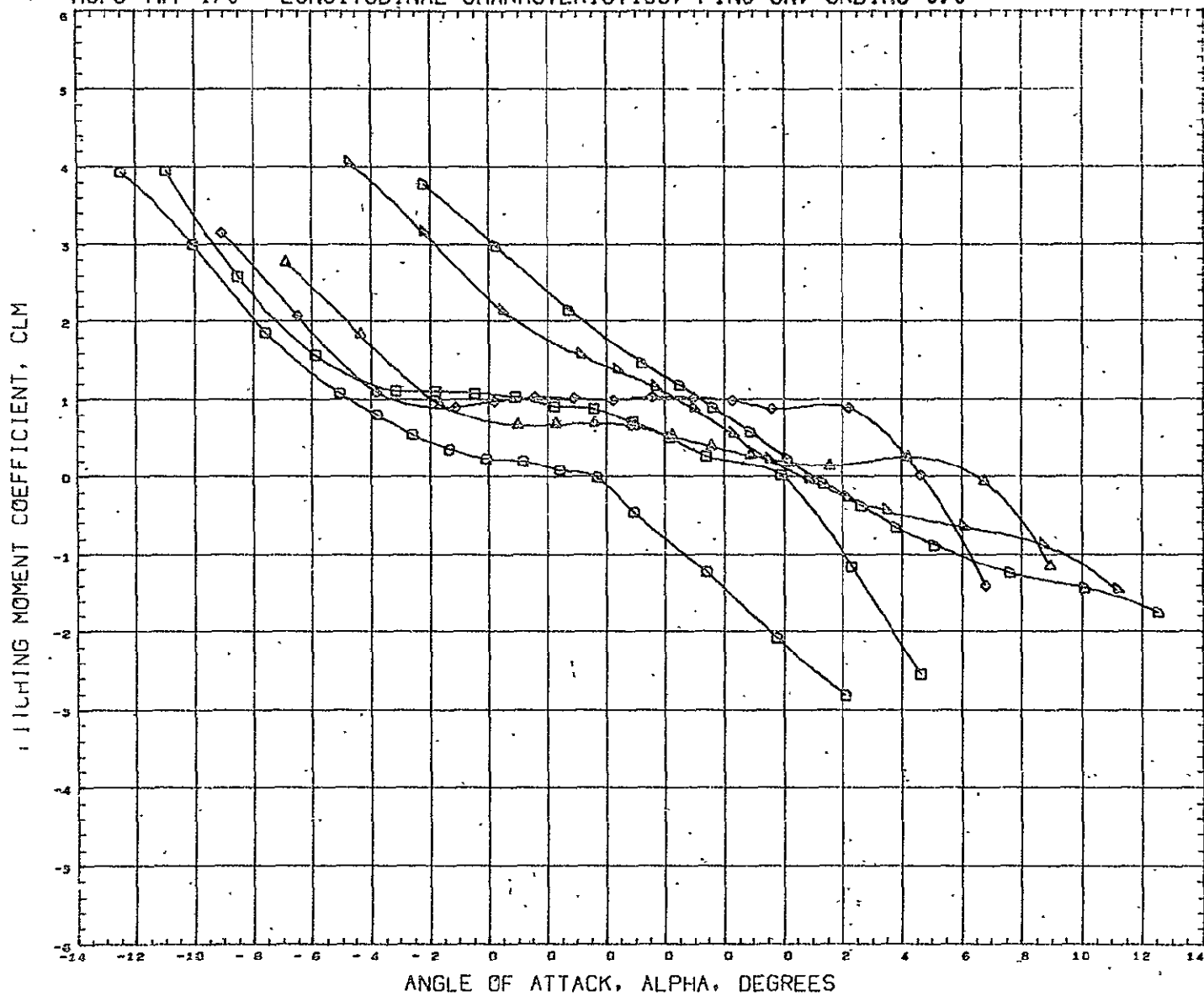
TWT470 S-IC/GAC ORBITER BF10WHVS FINS ON

(J24021) 29 JAN 71

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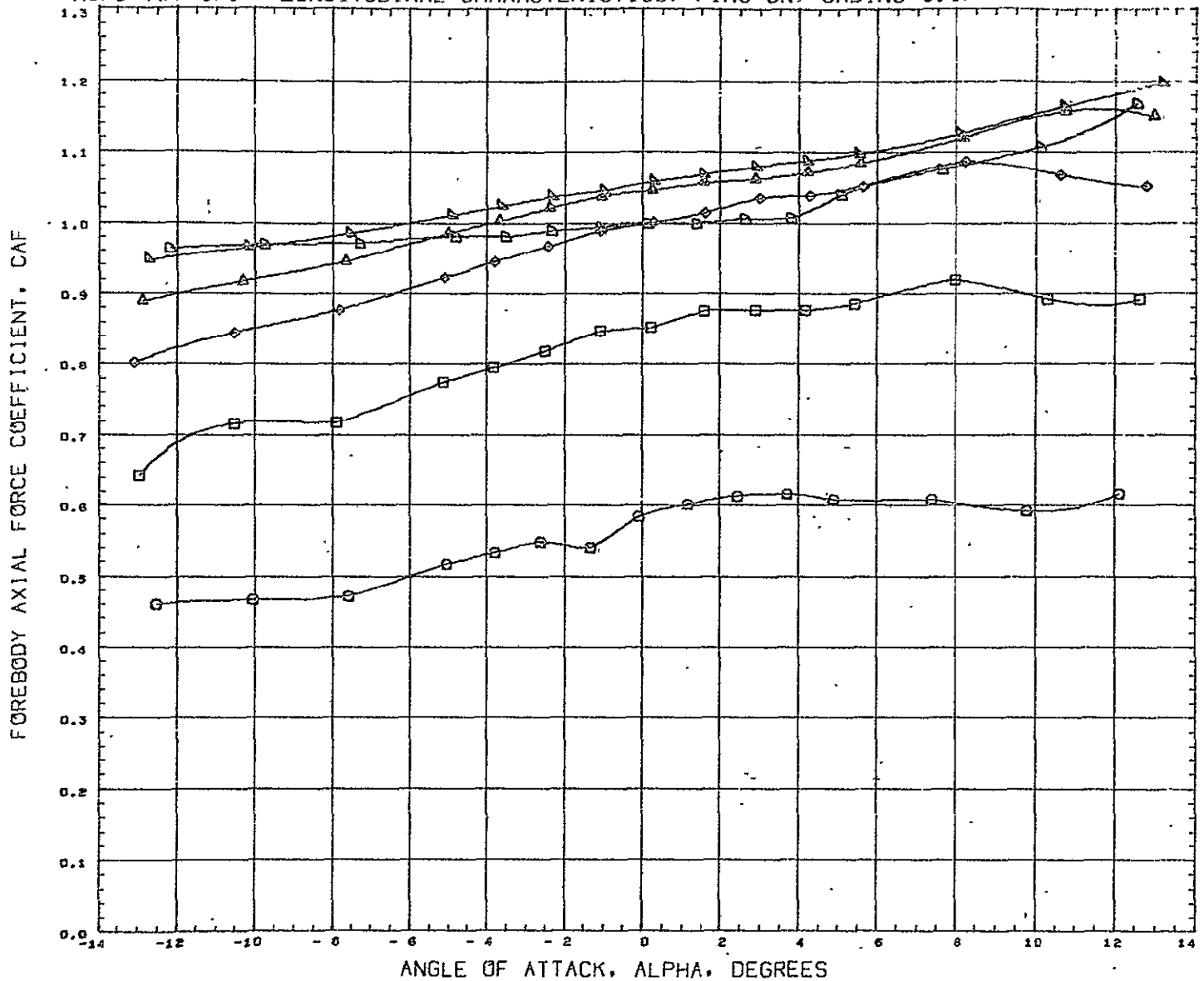
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=0.0



MBOL	MACH	PARAMETRIC VALUES			
○	0.903	BETA	-0.090	ORBINC	0.000
□	1.001	WINGINC	4.000	HTAIL	0.000
◇	1.101	PHIB	0.000		
△	1.202				
▽	1.456				
⊙	1.985	DATA HIST. CODE	*A		

REFERENCE INFORMATION		
REFS	1.3960	50. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=0.0.



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.905	BETA	-0.090	ORBINC	0.000
□	1.001	WINGINC	4.000	HTAIL	0.000
◇	1.101	PHIB	0.000		
△	1.202				
▽	1.450				
◇	1.965	DATA HIST. CODE	#A		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

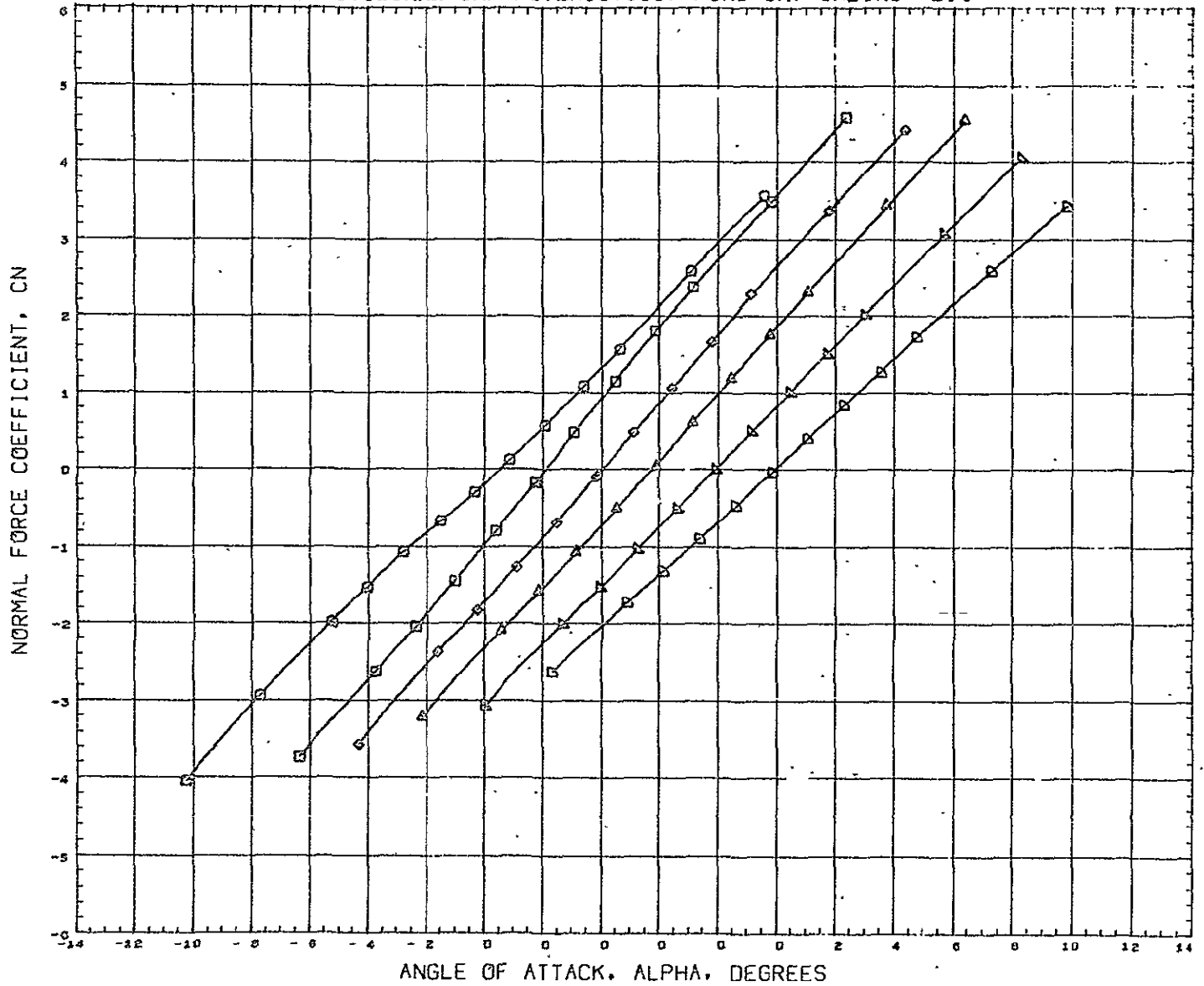
TWT470 S-1C/GAC ORBITER BF10WHVS FINS ON

(J24021) 29 JAN 71

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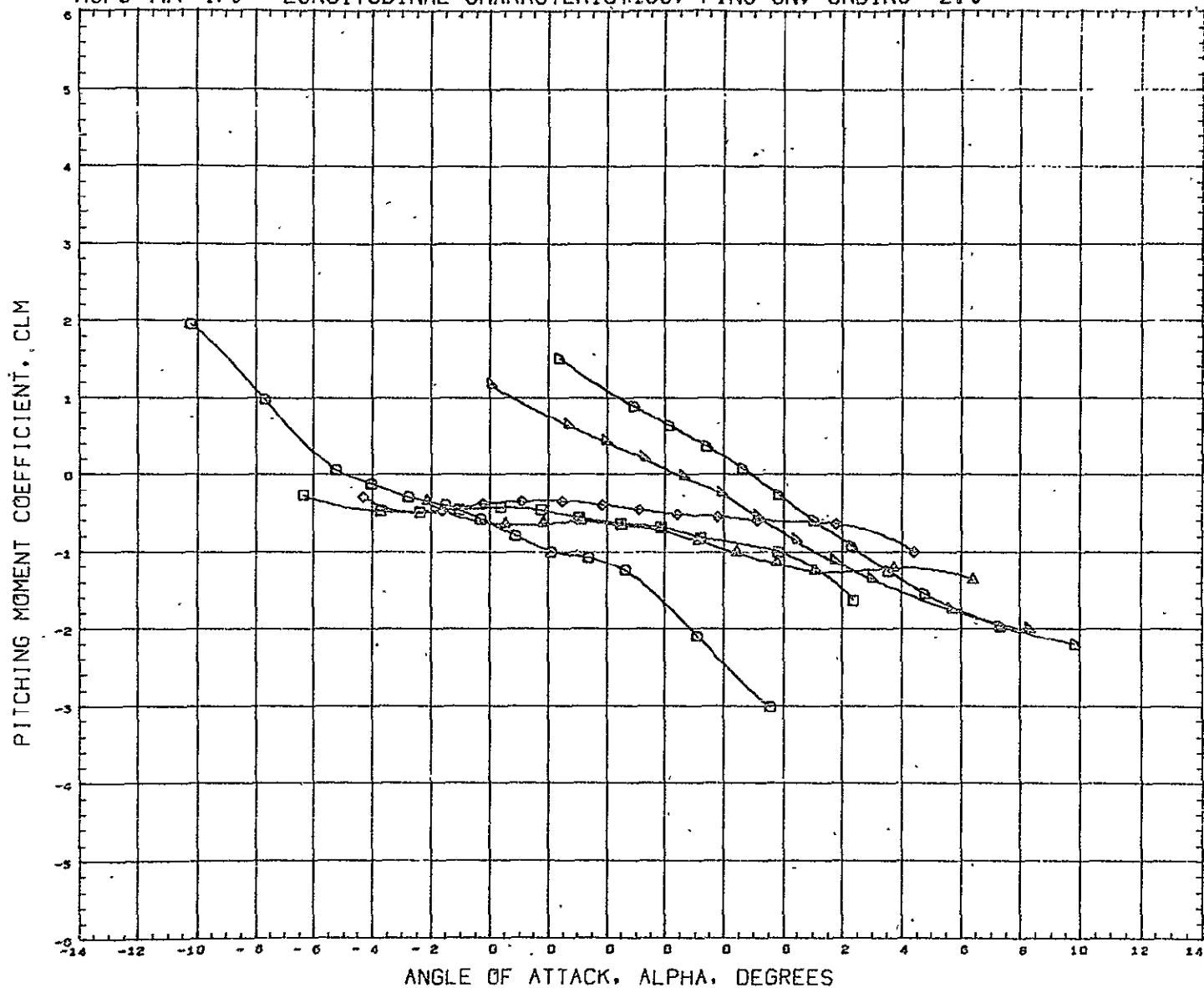
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-2.0



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.899	BETA	- 0.070	ORBINC	- 2.000
□	0.993	WINGINC	4.000	HTAIL	0.000
◇	1.105	PHIB	0.000		
△	1.196				
▽	1.456				
+	1.956	DATA HIST. CODE	#A		

REFERENCE INFORMATION		
REFS	1.3960	sq. in.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-2.0



SYMBOL	MACH	PARAMETRIC VALUES			
□	0.899	BETA	- 0.070	ORBINC	- 2.000
□	0.993	WINGINC	4.000	HTAIL	0.000
◇	1.105	PHIB	0.000		
△	1.196				
▽	1.453				
D	1.938	DATA HIST. CODE	#A		

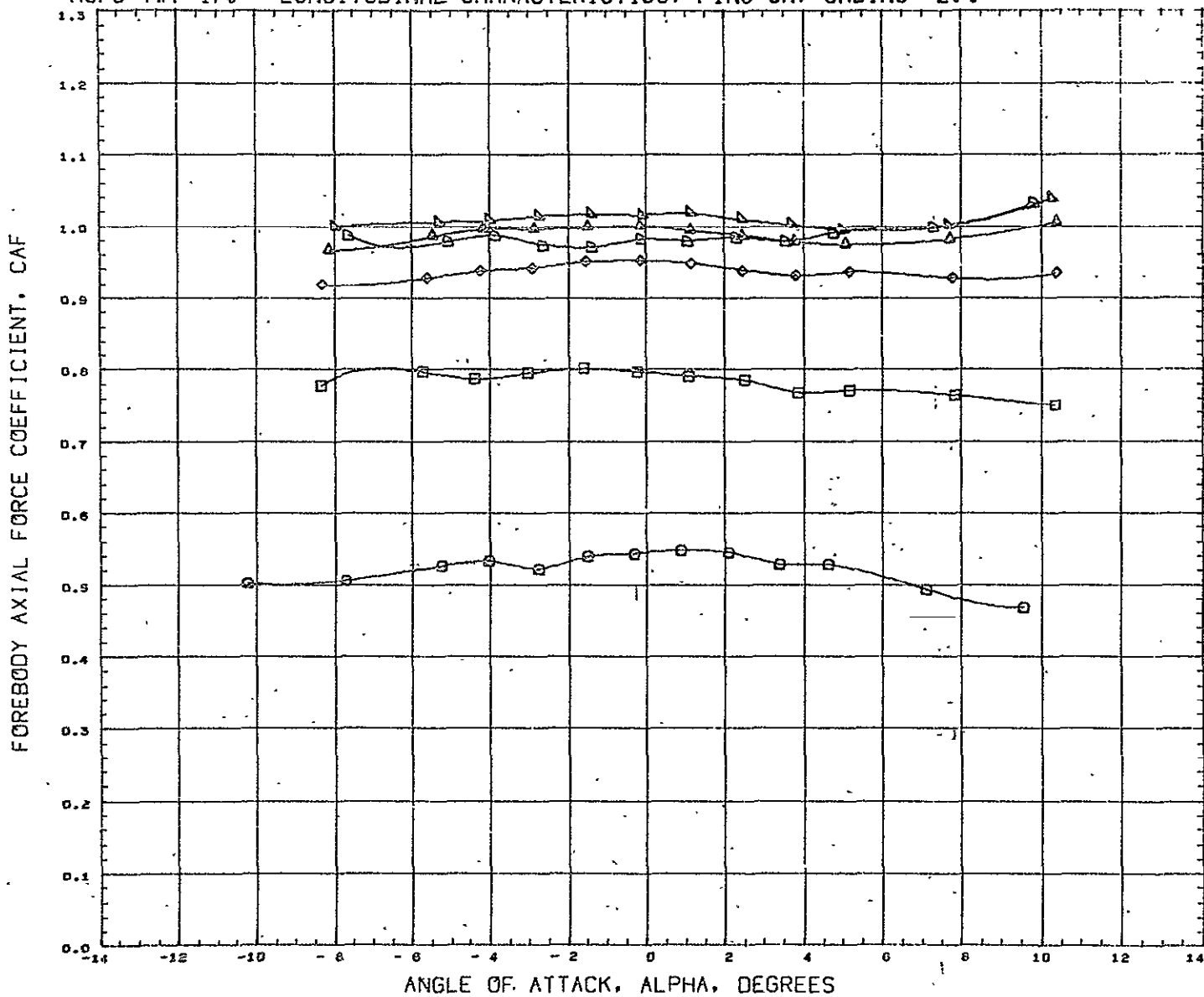
REFERENCE INFORMATION		
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REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

TWT470 S-1C/GAC ORBITER BF10WHVS FINS ON

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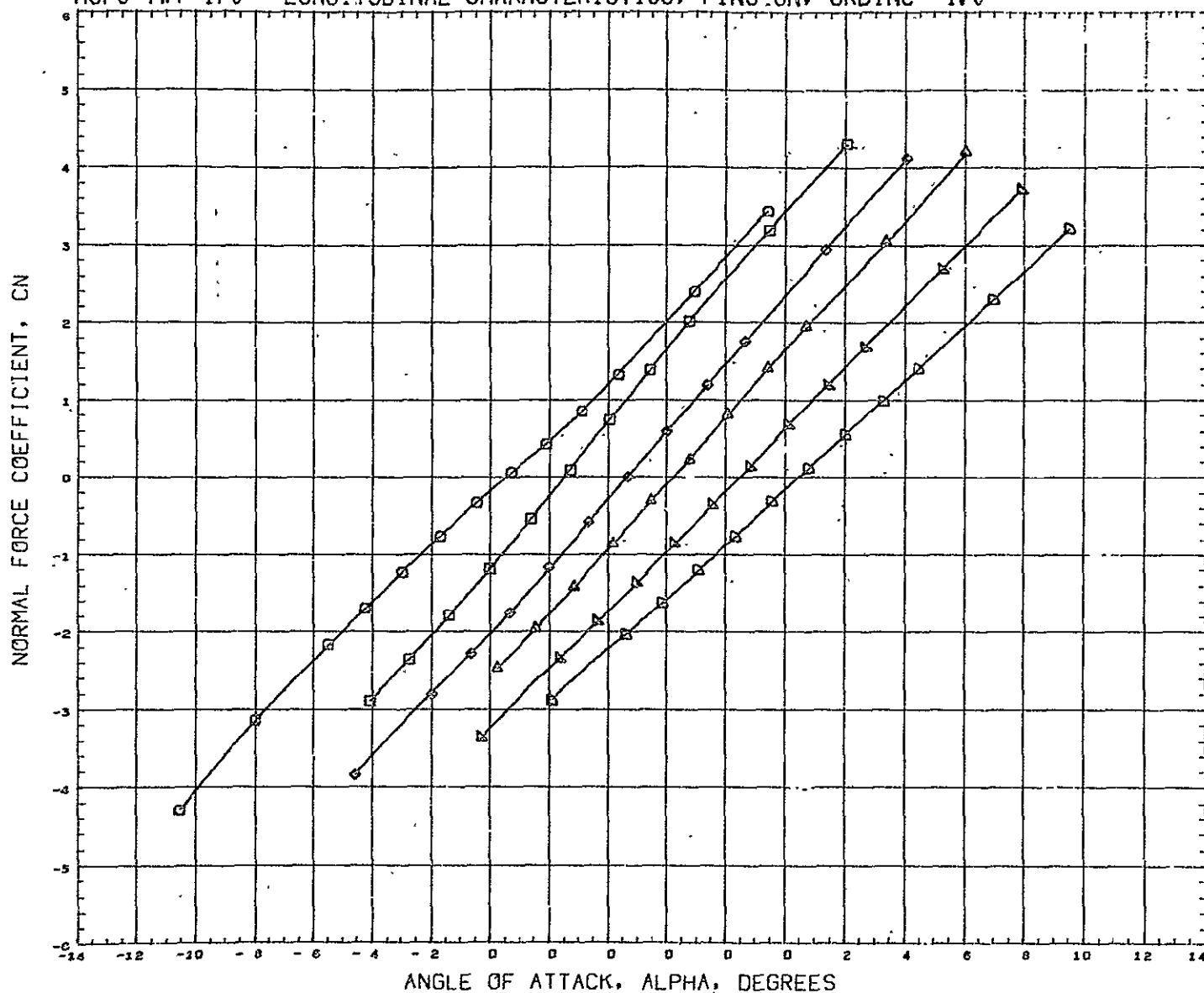
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-2.0



SYMBOL	MACH	PARAMETRIC VALUES			
□	0.899	BETA	- 0.070	ORBINC	- 2.000
□	0.993	WINGINC	4.000	NTAIL	0.000
◇	1.105	PHIB	0.000		
△	1.196				
▽	1.456				
D	1.956	DATA HIST. CODE	9A		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRF	0.0000	INCHES
ZHRF	0.0000	INCHES
SCALE	0.3366	PERCENT

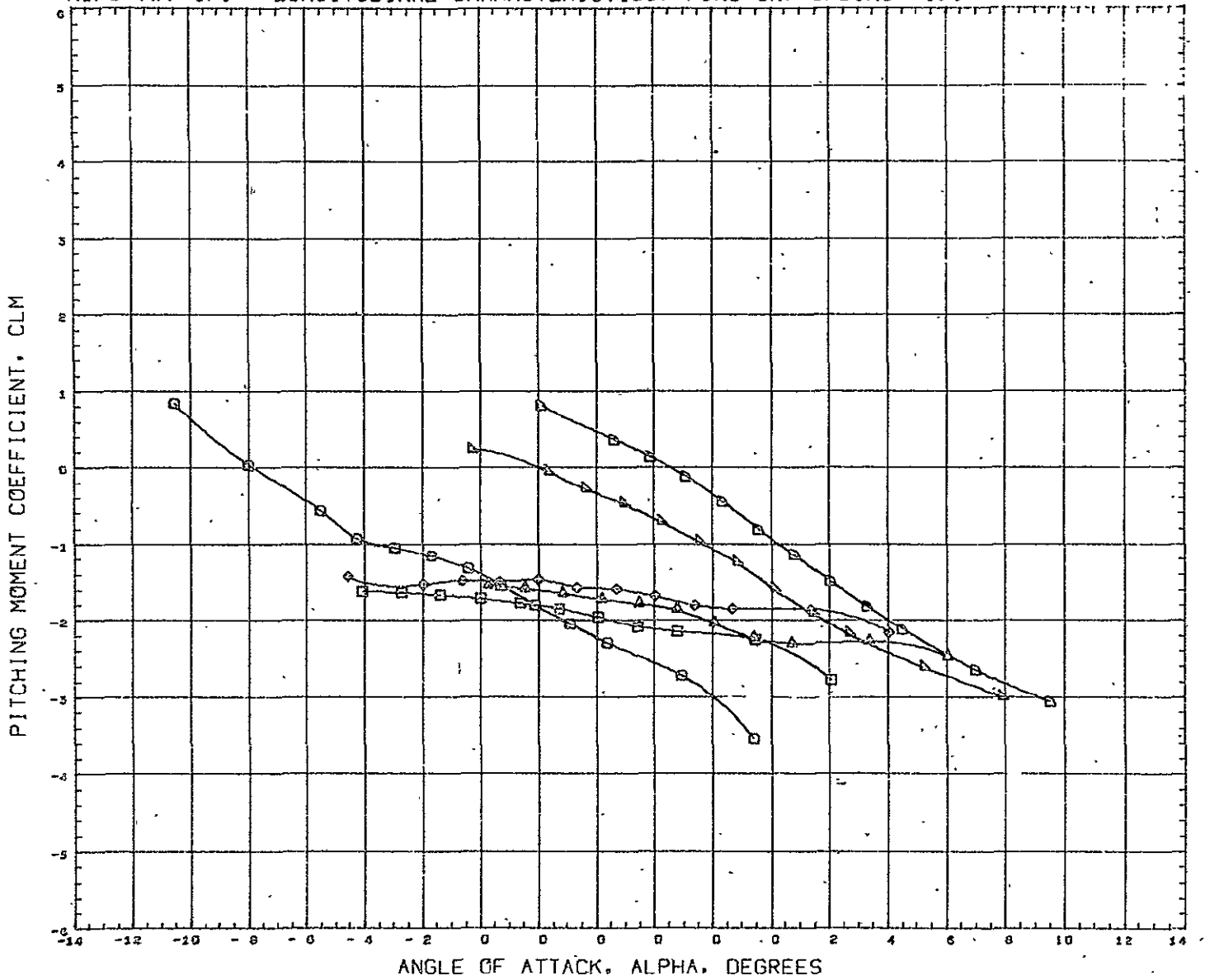
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-4.0



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.901	BETA	- 0.050	ORBINC	- 4.000
□	1.000	WINGINC	4.000	HTAIL	0.000
◇	1.098	PHIB	0.000		
△	1.193				
▽	1.458				
+	1.930	DATA HIST. CODE	*A		

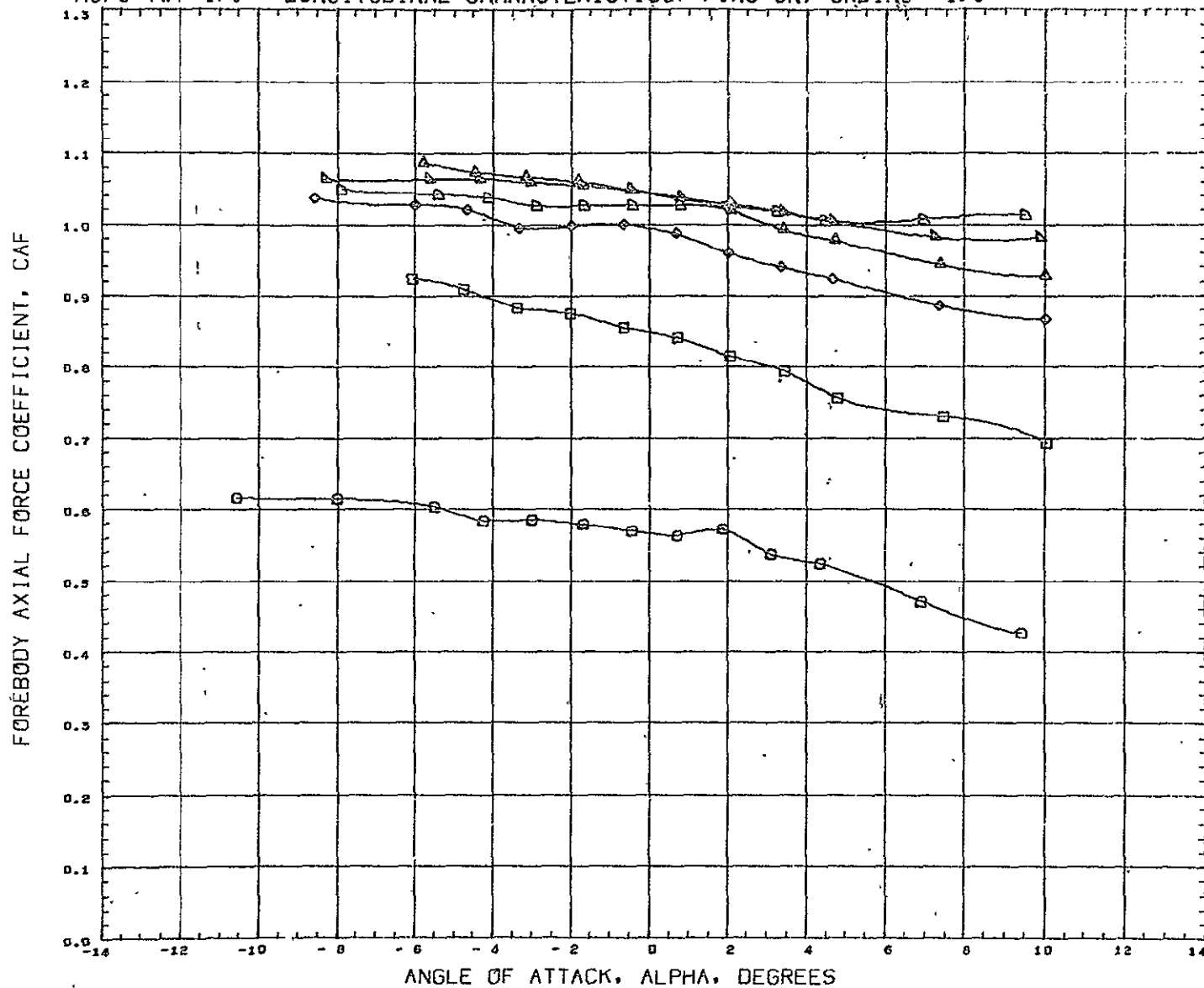
REFERENCE INFORMATION		
REFS	1.3960	sq.in.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-4.0



SYMBOL	MACH	PARAMETRIC VALUES				REFERENCE INFORMATION		
O	0.901	BETA	- 0.050	ORBINC	- 4.000	REFS	1.3960	SQ. IN.
□	1.000	WINGINC	4.000	HTAIL	0.000	REFL	1.3330	INCHES
◇	1.096	PHIB	0.000			REFB	1.3330	INCHES
△	1.193					XMRP	5.2640	INCHES
▽	1.450					YMRP	0.0000	INCHES
◊	1.950					ZMRP	0.0000	INCHES
D	1.950	DATA HIST. CODE	#A			SCALE	0.3366	PERCENT

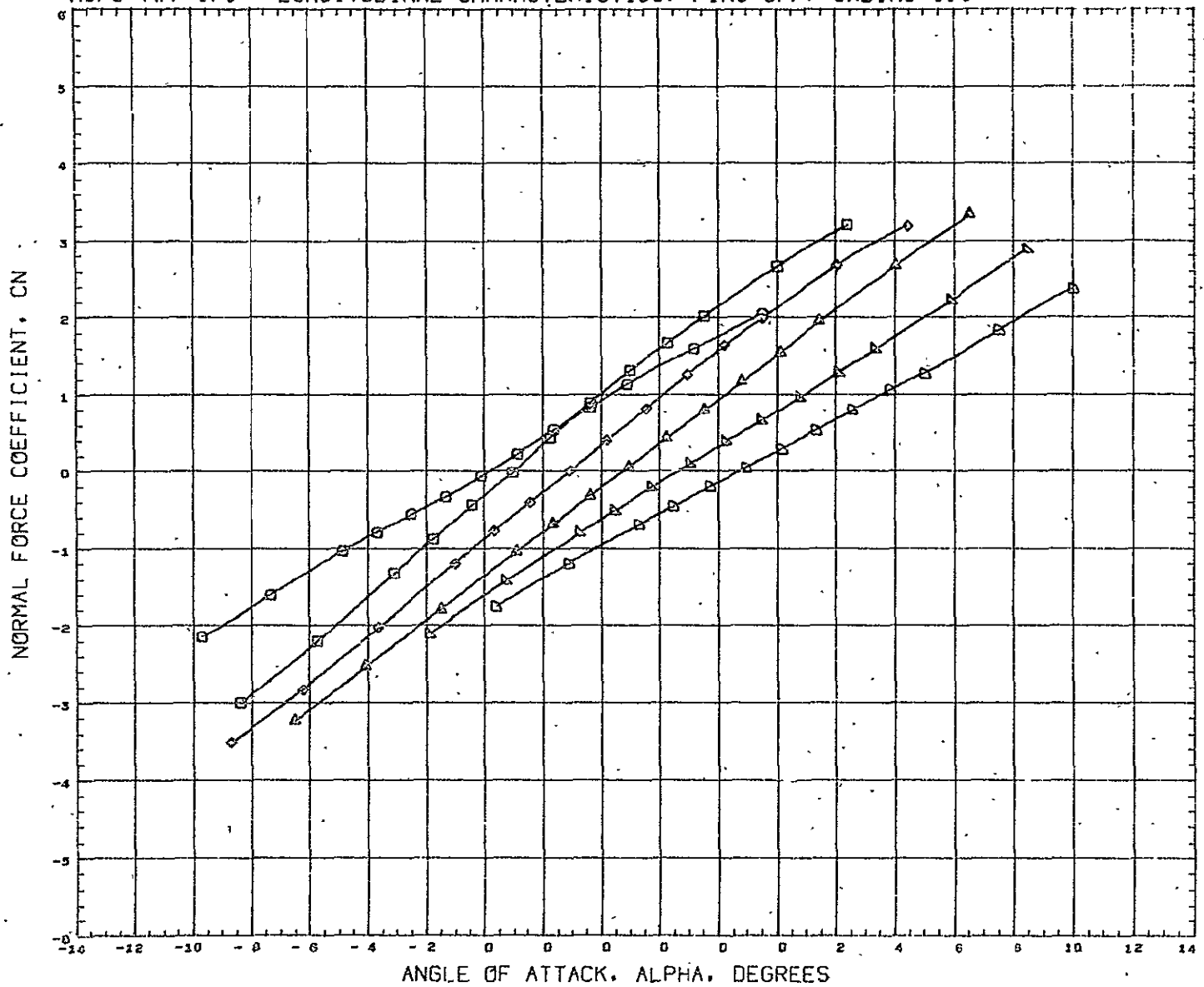
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-4.0



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.901	BETA	- 0.050	ORBINC	- 4.000
□	1.000	WNGINC	4.000	HTAIL	0.000
◇	1.098	PHIB	0.000		
△	1.193				
▽	1.458				
D	1.930	DATA HIST. CODE	#4		

REFERENCE INFORMATION		
REFS	1.3960	50. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

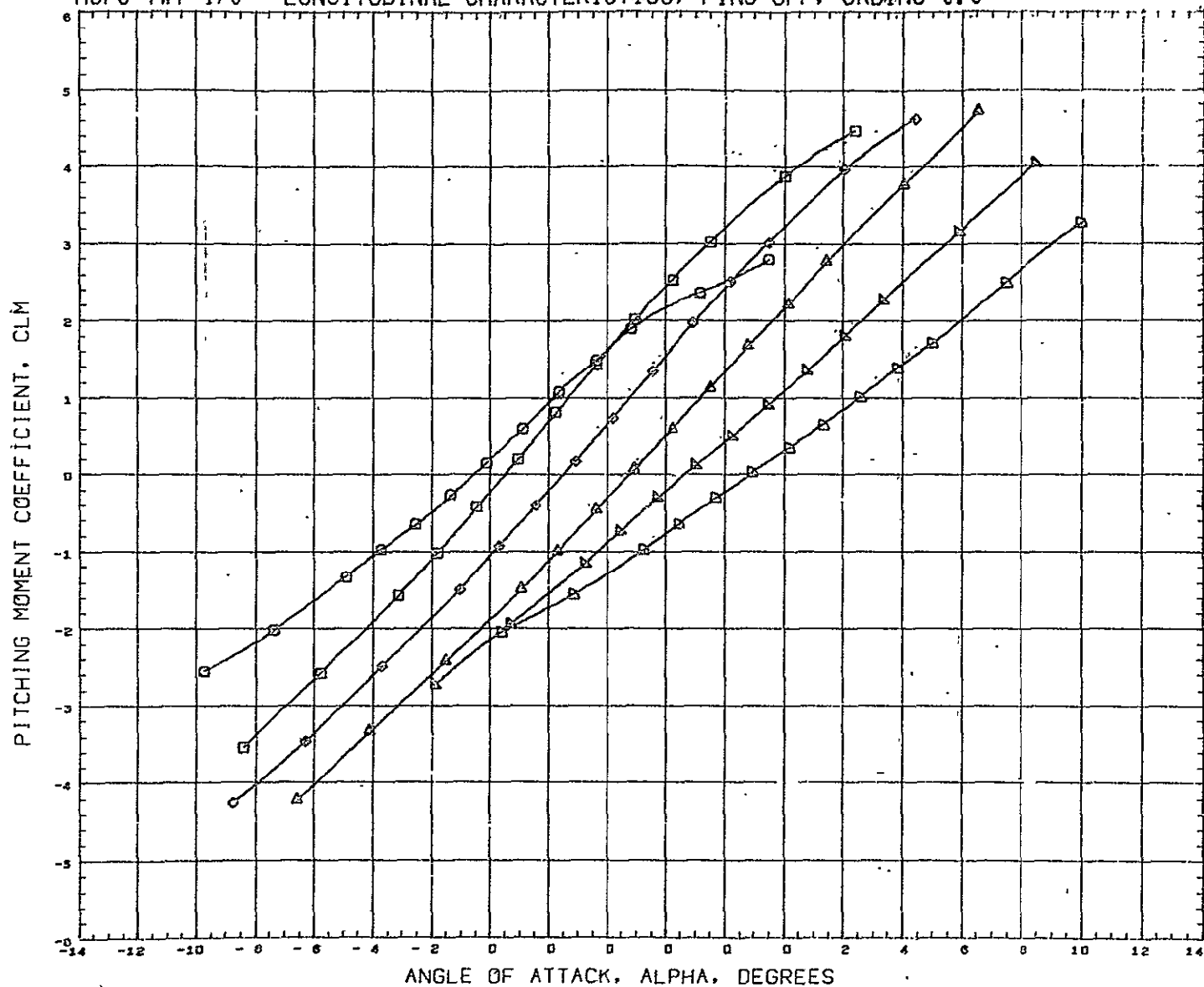
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=0.0



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.099	BETA	0.050	ORDINC	0.000
□	0.993	WINGINC	4.000	HTAIL	0.000
◇	1.101	PHIB	0.000		
△	1.261				
▽	1.437				
+	1.991	DATA HIST. CODE	*A		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=0.0



SYMBOL	MACH	PARAMETRIC VALUES			
□	0.899	BETA	- 0.030	ORBINC	0.000
◇	0.993	WNGINC	4.000	HTAIL	0.000
◇	1.101	PHID	0.000		
△	1.201				
▽	1.457				
○	1.931	DATA HIST. CODE	#A		

REFERENCE INFORMATION		
REFS	1.3960	SQ.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

TWT470 S-IC/GAC ORBITER BOWHVS

FINS OFF

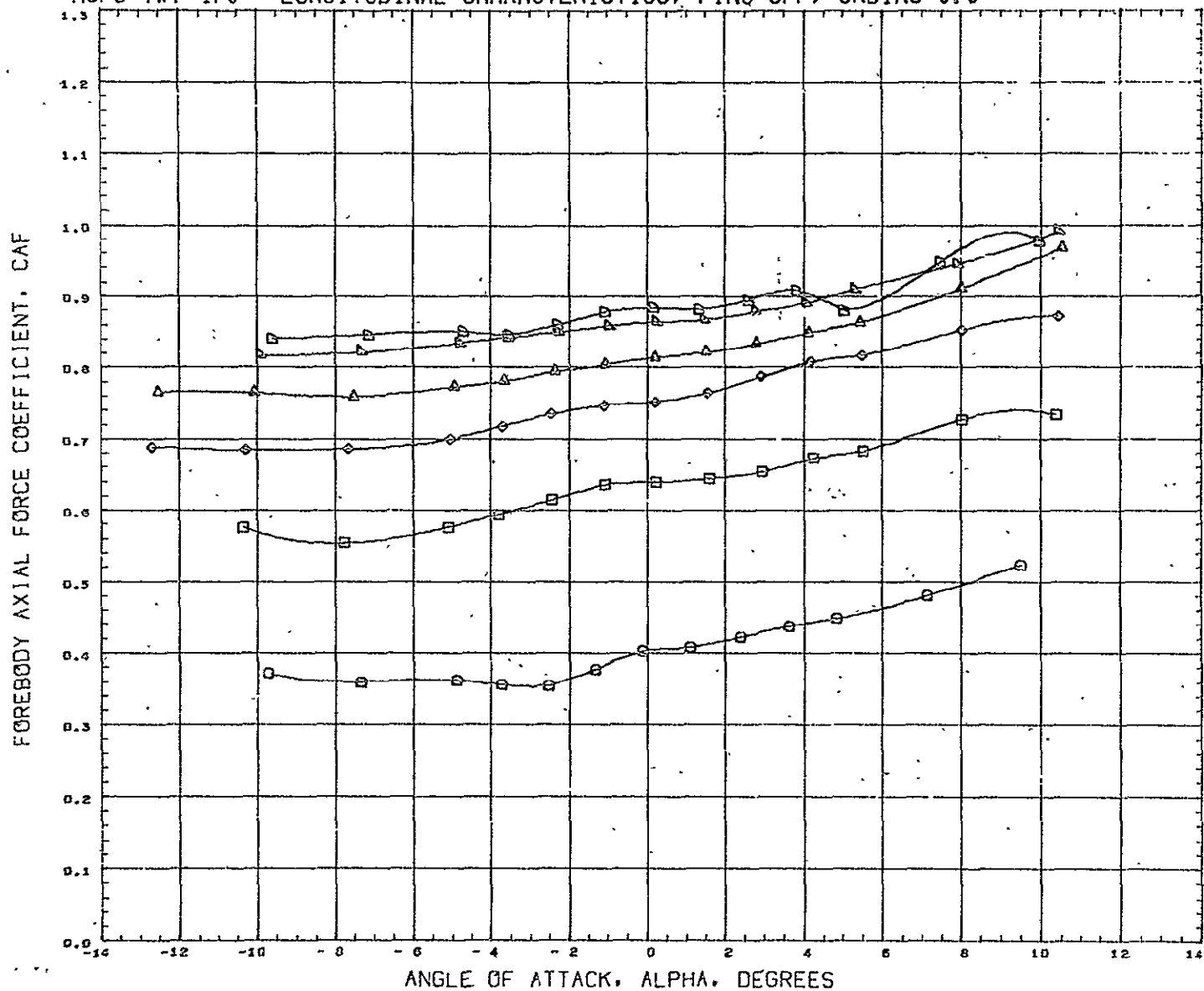
(J24051)

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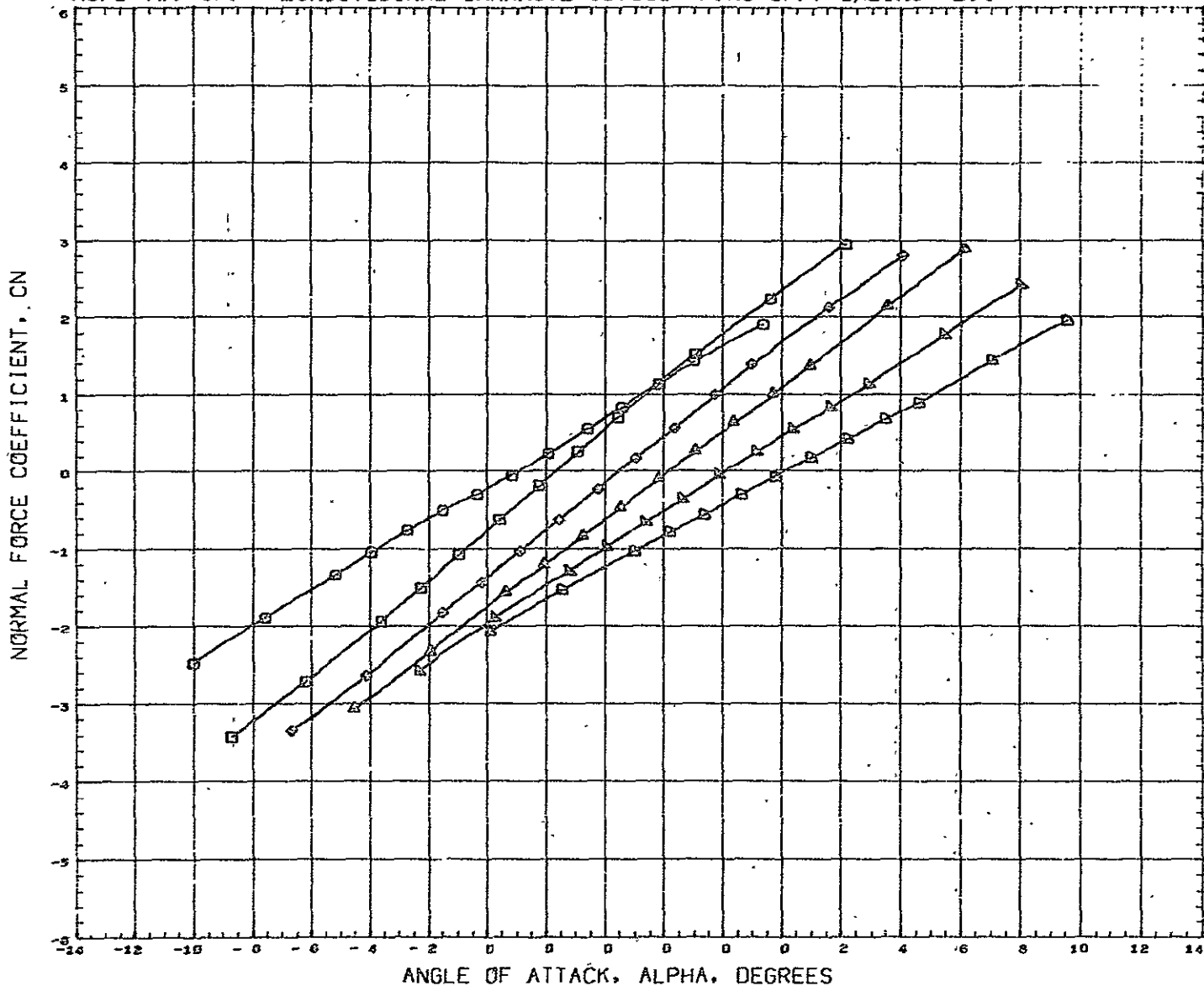
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=0.0



SYMBOL	MACH	BETA	PARAMETRIC VALUES	ORBINC	HTAIL
○	0.899	-	0.050	0.000	0.000
□	0.993	WINGINC	4.000	0.000	0.000
◇	1.101	PHIB	0.000		
△	1.201				
▽	1.457				
+	1.951	DATA HIST. CODE	#A		

REFERENCE INFORMATION		
REFS	1.3960	50. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

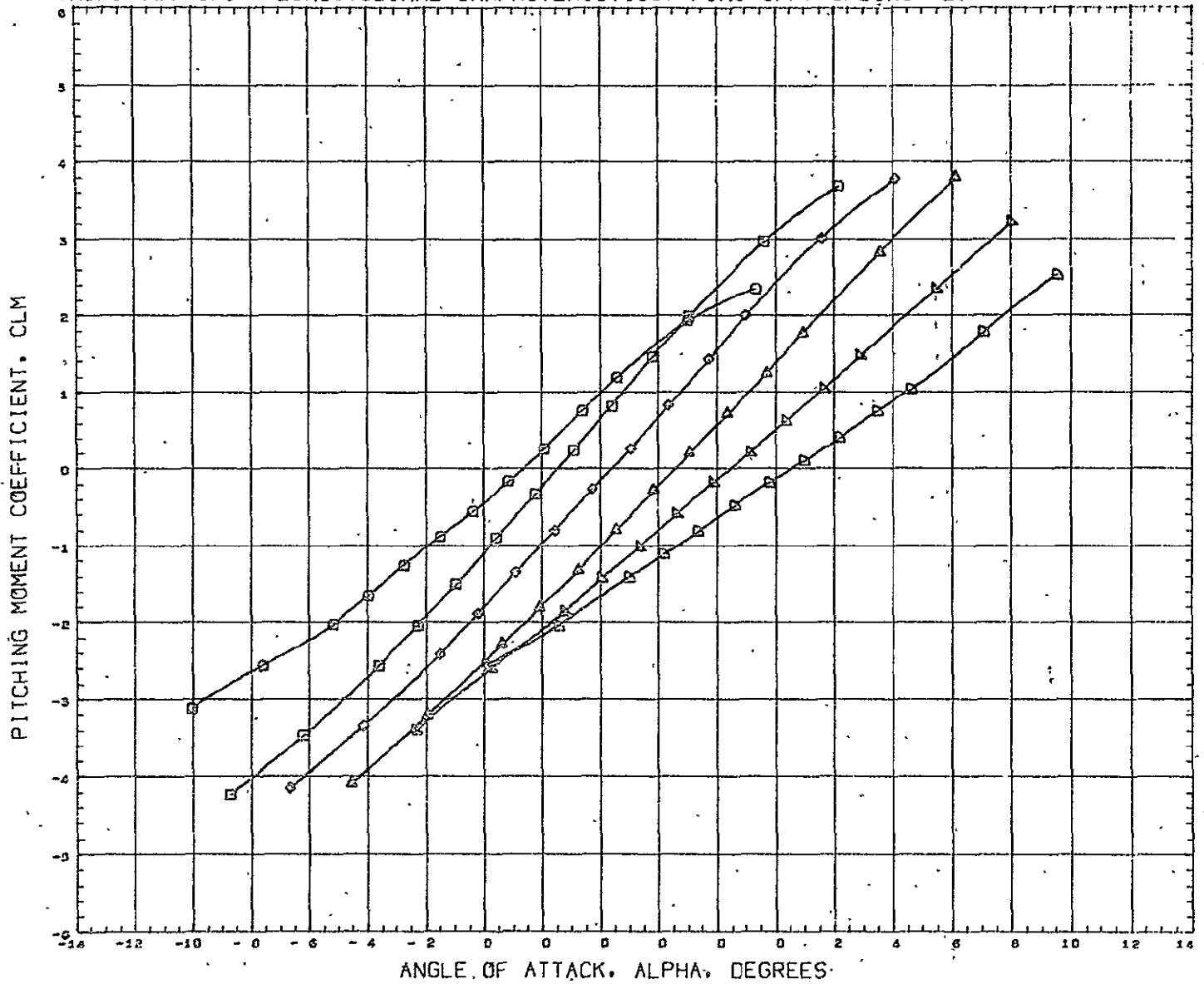
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=-2.0



SYMBOL	MACH	PARAMETRIC VALUES			
□	0.905	BETA	- 0.000	ORBINC	- 2.000
◇	0.994	UNQINC	4.000	MTAIL	0.000
○	1.100	PH13	0.000		
△	1.203				
▽	1.454				
○	1.950	DATA HIST. CODE	*A		

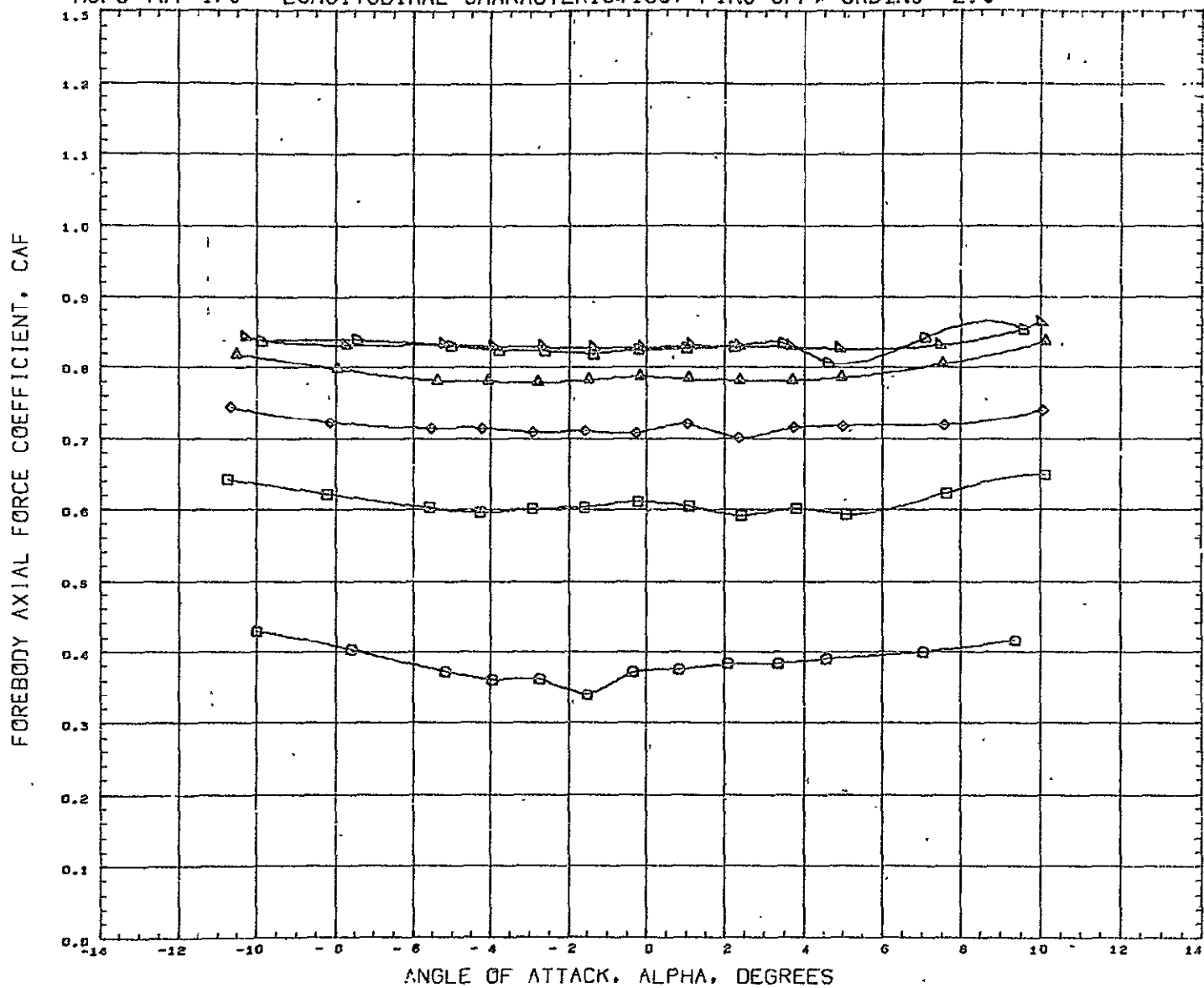
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YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=-2.0



SYMBOL	MACH	PARAMETRIC VALUES				REFERENCE INFORMATION		
□	0.905	BETA	- 0.080	ORBINC	- 2.000	REFS	1.3960	SQ. IN.
◇	0.994	WINGINC	4.000	HTAIL	0.000	REFL	1.3330	INCHES
○	1.300	PHIB	0.000			REFB	1.3330	INCHES
△	1.203					XMRP	5.2640	INCHES
▽	1.454					YNRP	0.0000	INCHES
◈	1.960					ZMRP	0.0000	INCHES
		DATA HIST. CODE	0A			SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=-2.0



SYMBOL	MACH	PARAMETRIC VALUES			
□	0.905	BETA	- 0.000	ORBINC	- 2.000
□	0.994	WINGINC	4.000	HTAIL	0.000
◇	1.100	PHIB	0.000		
△	1.203				
▽	1.454				
D	1.960	DATA HIST. CODE	*A		

REFERENCE INFORMATION		
REFS	1.3960	SO.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRF	5.2640	INCHES
YNRF	0.0000	INCHES
ZNRF	0.0000	INCHES
SCALE	0.3366	PERCENT

TWT470 S-IC/CAC ORBITER BOWHVS

FINS OFF

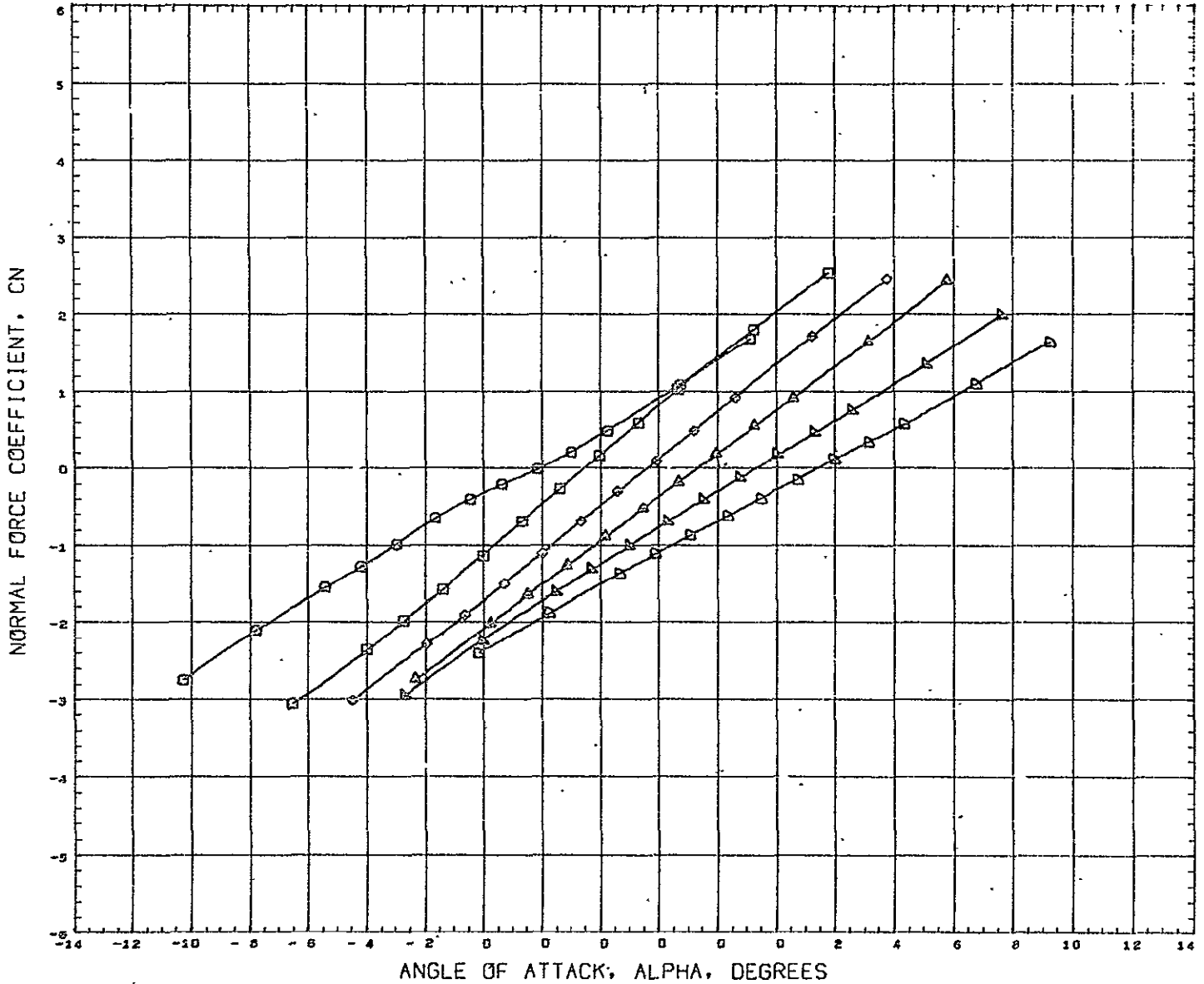
(J24061)

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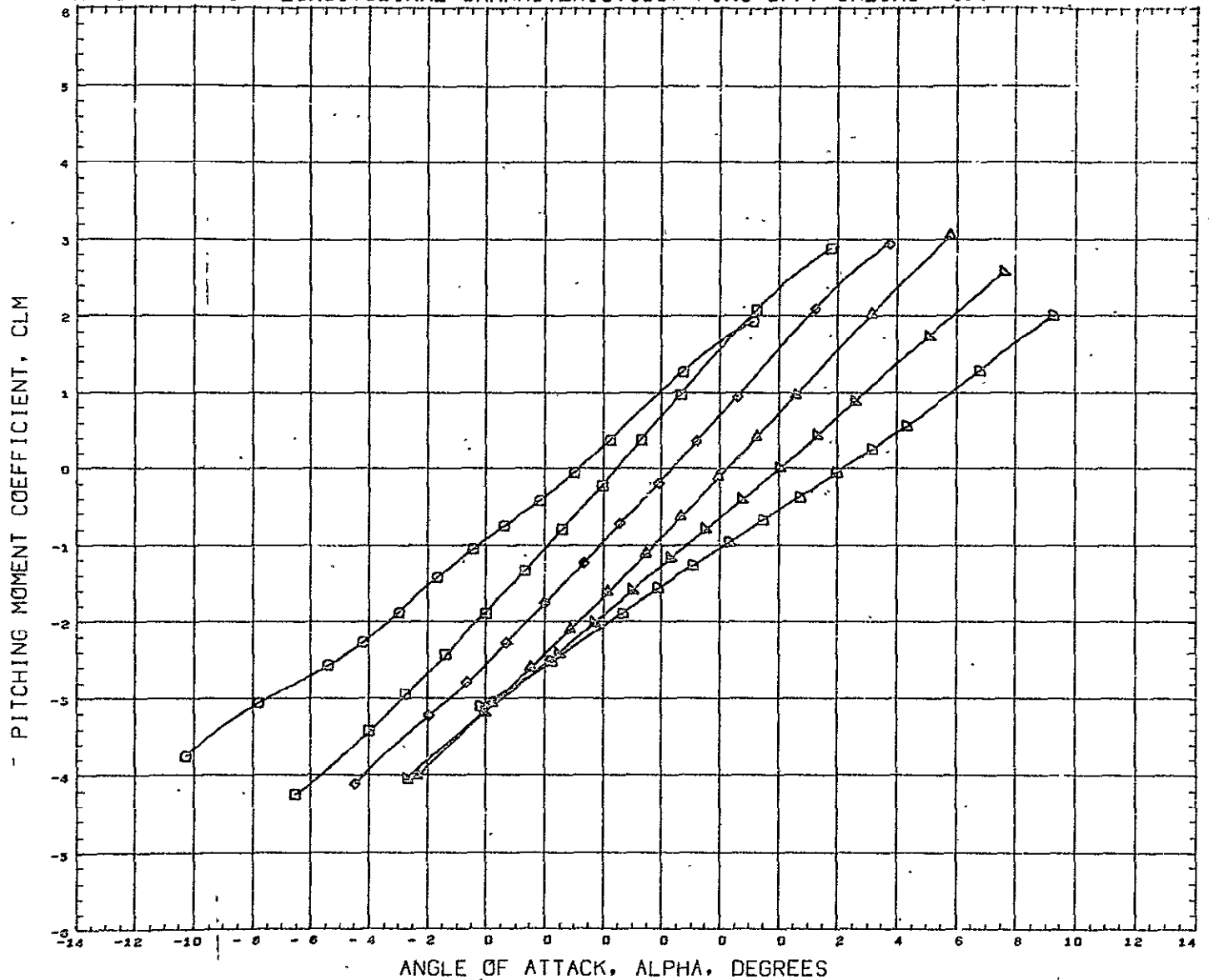
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=-4.0



SYMBOL	MACH	PARAMETRIC VALUES			
□	0.900	BETA	- 0.040	ORBINC	- 4.000
□	0.967	WINGINC	4.000	HTAIL	0.000
○	1.100	PHIB	0.000		
△	1.199				
▽	1.460				
◇	1.932	DATA HIST. CODE	#A		

REFERENCE INFORMATION		
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REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=-4.0



SYMBOL		PARAMETRIC VALUES				REFERENCE INFORMATION		
□	0.900	BETA	0.040	ORBINC	-4.000	REFS	1.3960	SQ. IN.
□	0.997	WNGINC	4.000	HTAIL	0.000	REFL	1.3330	INCHES
◇	1.100	PHIS	0.000			REFB	1.3330	INCHES
△	1.199					XHRP	5.2640	INCHES
▽	1.460					YHRP	0.0000	INCHES
◇	1.952	DATA HIST. CODE	*A			ZHRP	0.0000	INCHES
						SCALE	0.3366	PERCENT

TWT470 S-IC/GAC ORBITER BOWHVS

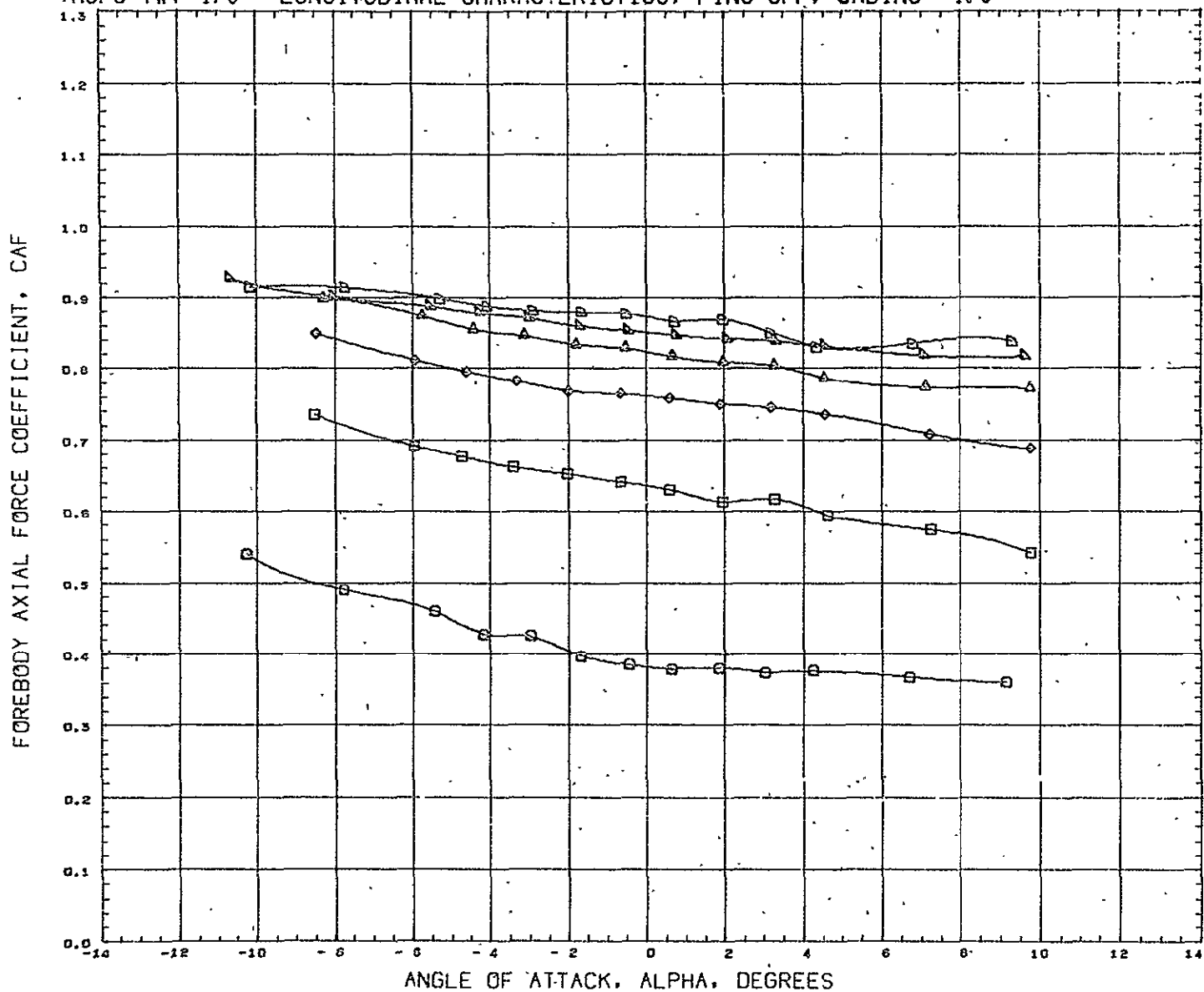
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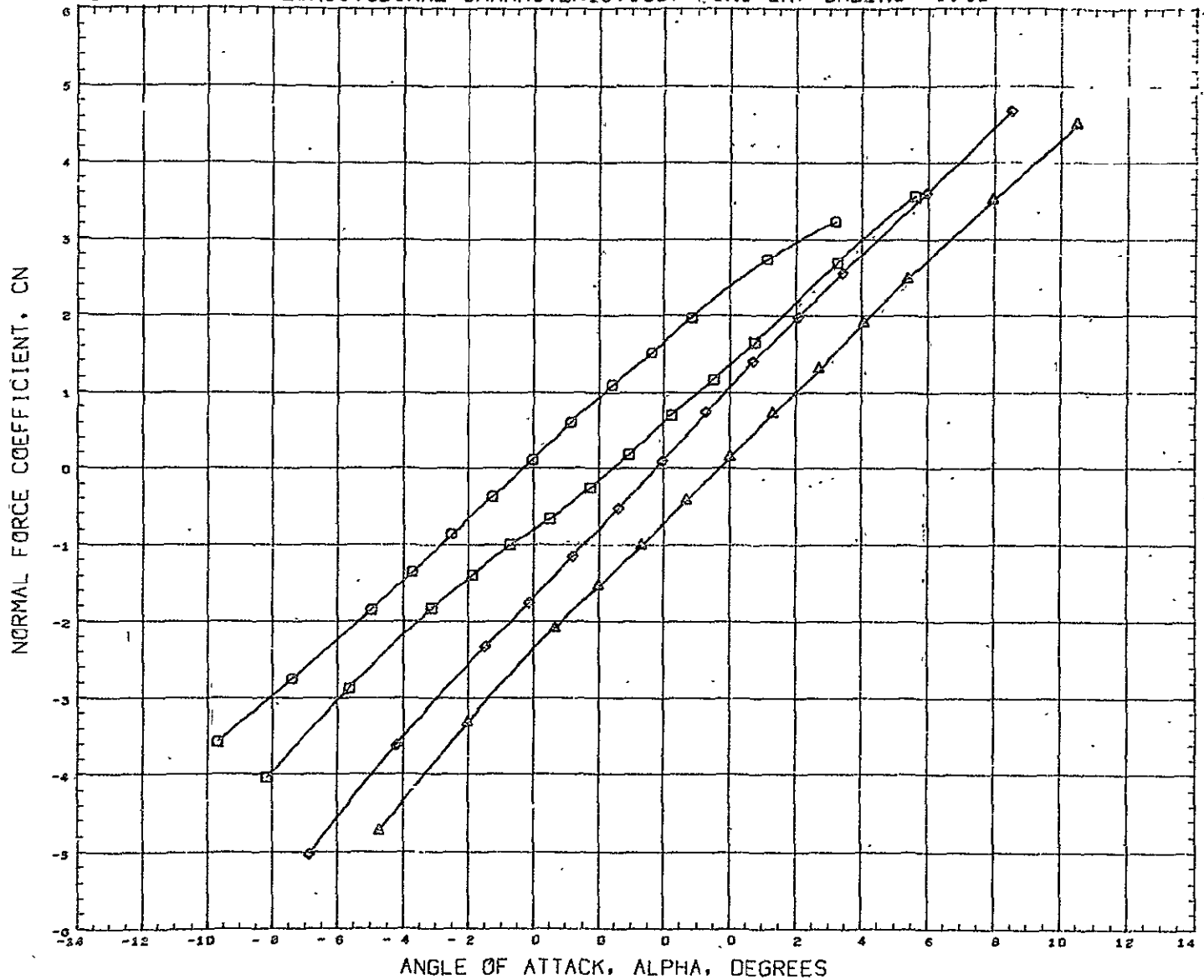
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=-4.0



SYMBOL	MACH	PARAMETRIC VALUES			
□	0.900	BETA	- 0.040	ORBINC	- 4.000
□	0.997	WINGINC	4.000	HTAIL	0.000
○	1.100	PHIB	0.000		
△	1.199				
▽	1.460				
D	1.952	DATA HIST. CODE	*A		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-1.05



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.599	BETA	- 0.050	ORBINC	- 1.050
□	0.699	WINGINC	4.000	HTAIL	0.000
◇	0.997	PHIB	0.000		
△	1.095				

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

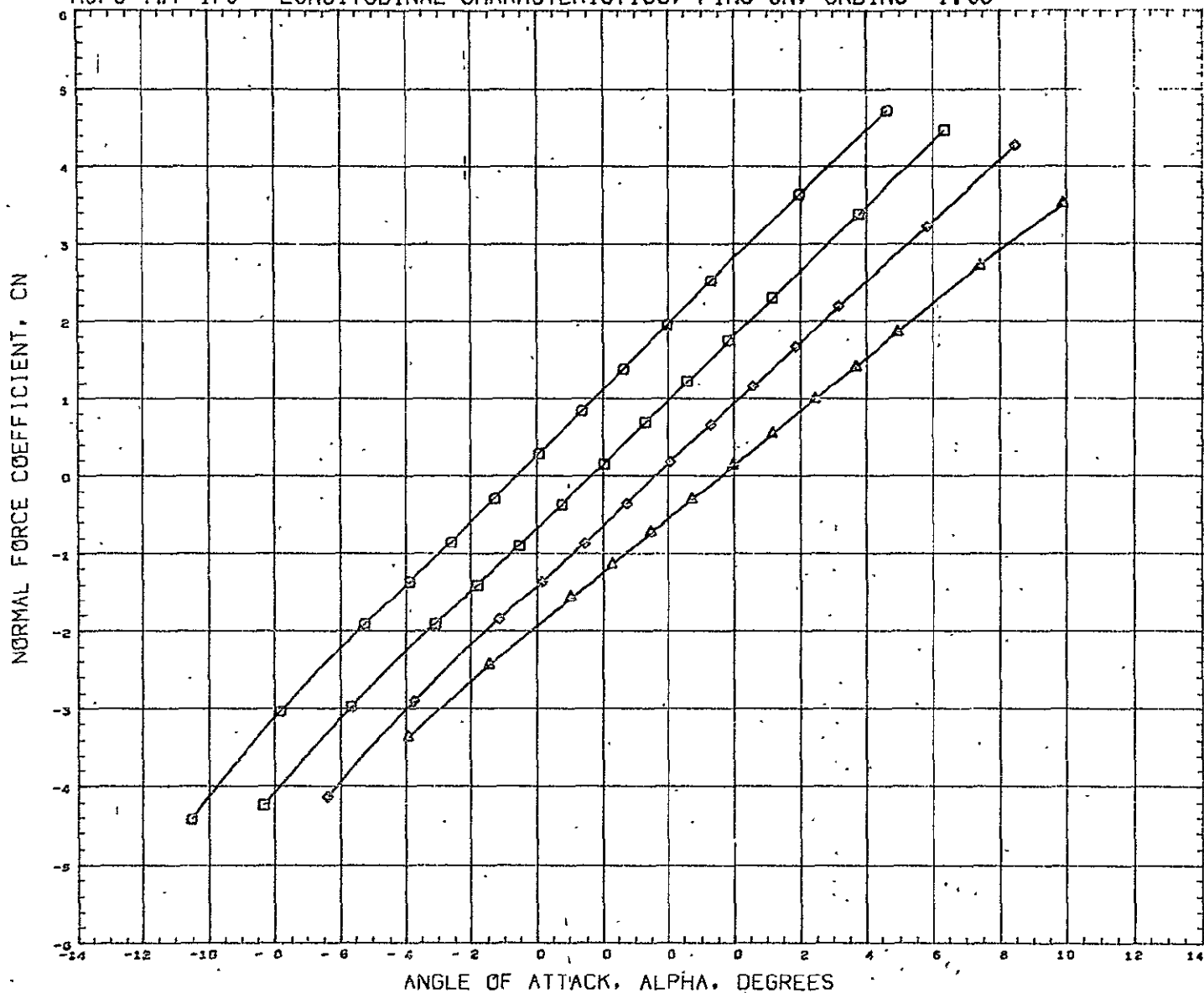
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TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-1.05

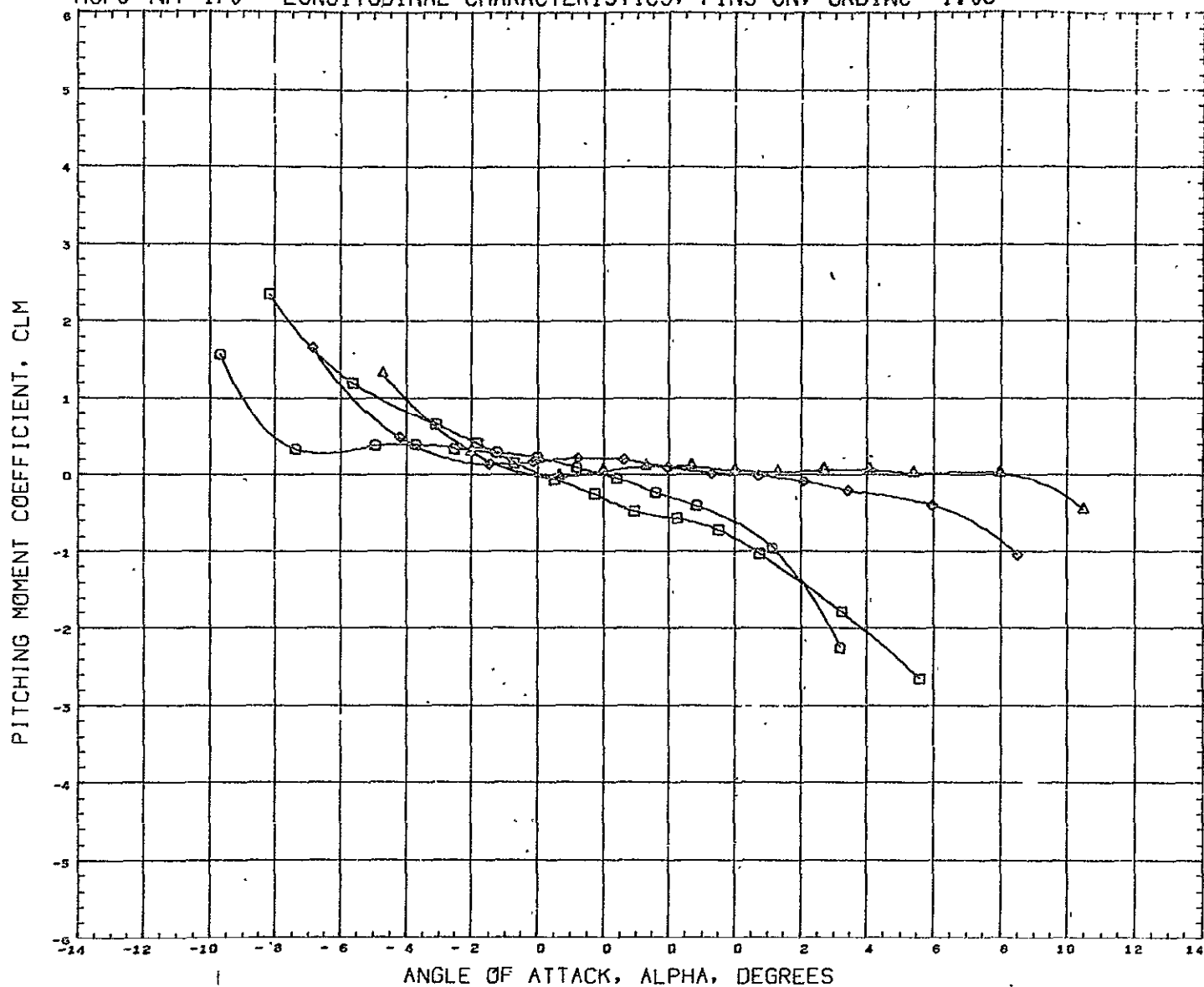


SYMBOL	HACH	PARAMETRIC VALUES			
□	1.195	BETA	0.050	ORBINC	-1.050
◊	1.505	WHGINC	4.000	HTAIL	0.000
○	1.456	PHIB	0.000		
△	1.987				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-1.05



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.599	BETA	- 0.050	ORBINC	- 1.050
□	0.899	WINGINC	4.000	HTAIL	0.000
◇	0.997	PHIB	0.000		
△	1.025				

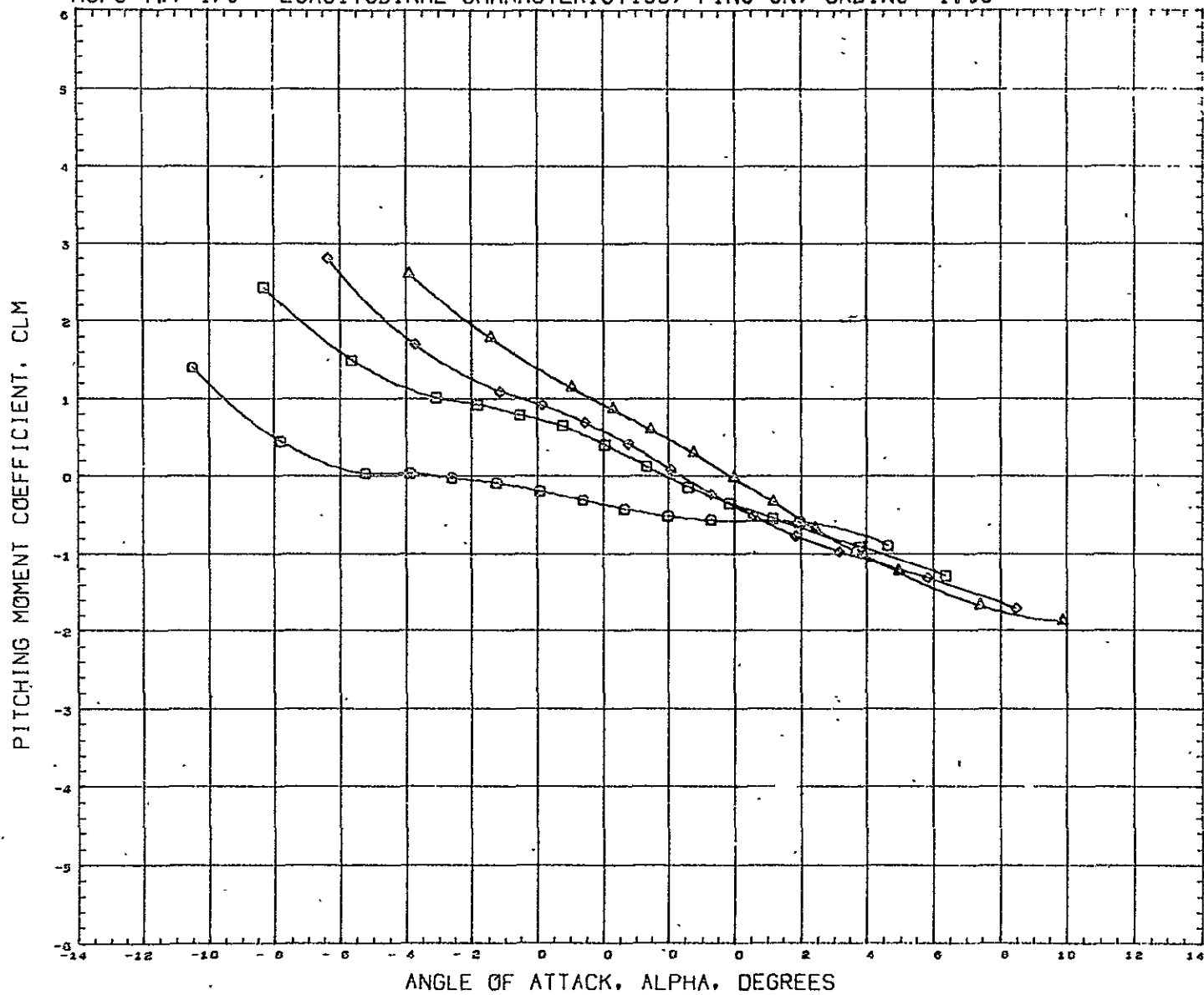
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YNRF	0.0000	INCHES
ZNRF	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-1.05



SYMBOL	MACH	PARAMETRIC VALUES			
□	1.195	BETA	-0.030	ORBINC	-1.050
◇	1.303	WINGINC	4.000	MTAIL	0.000
○	1.456	PHIB	0.000		
△	1.967				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
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YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

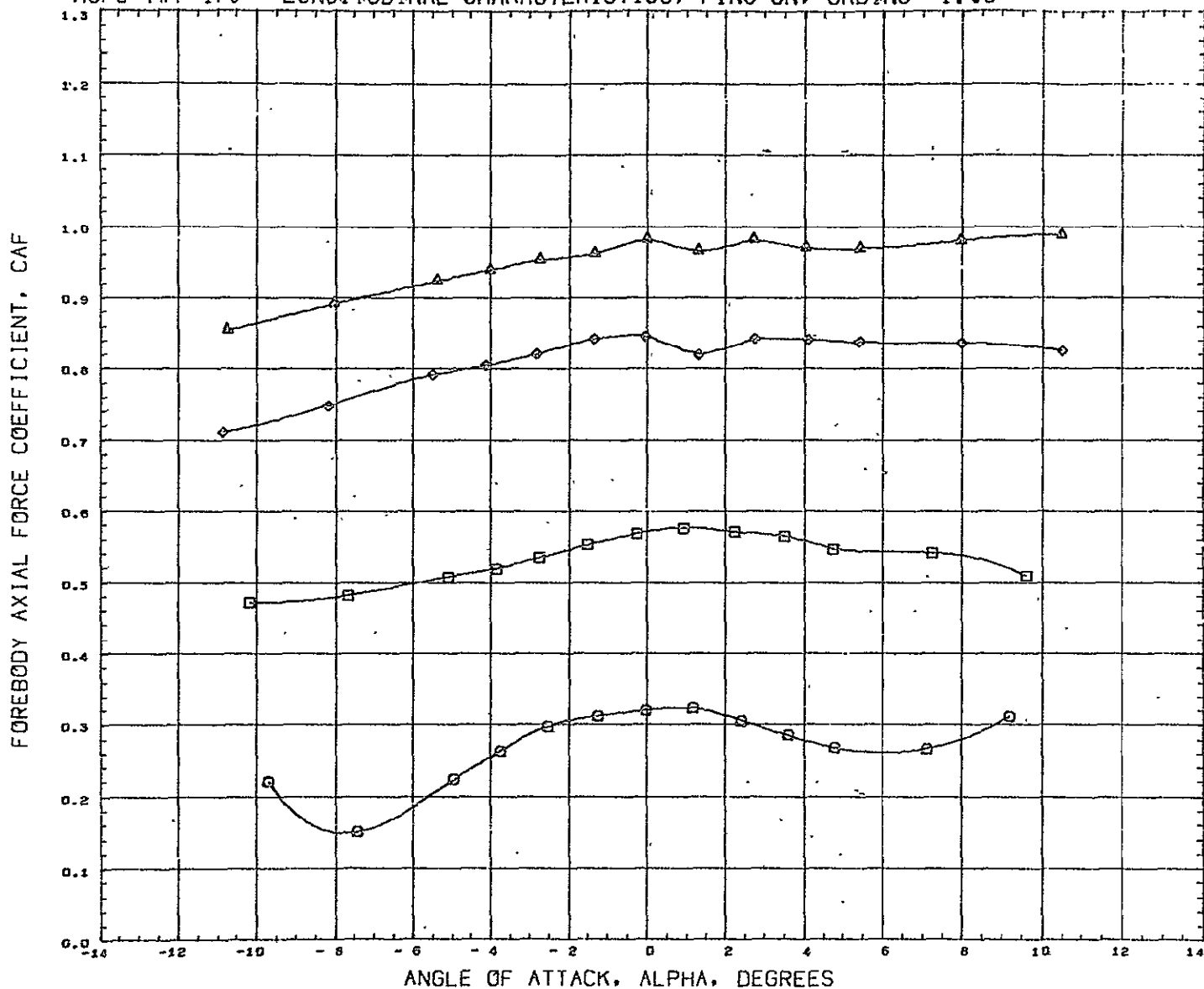
TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-1.05



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.599	BETA	- 0.050	ORBINC	- 1.050
□	0.899	WNGINC	4.000	HTAIL	0.000
◇	0.997	PHIB	0.000		
△	1.095				

REFERENCE INFORMATION		
REFS	1,3960	SQ. IN.
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REFB	1,3330	INCHES
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YMRP	0,0000	INCHES
ZMRP	0,0000	INCHES
SCALE	0.3366	PERCENT

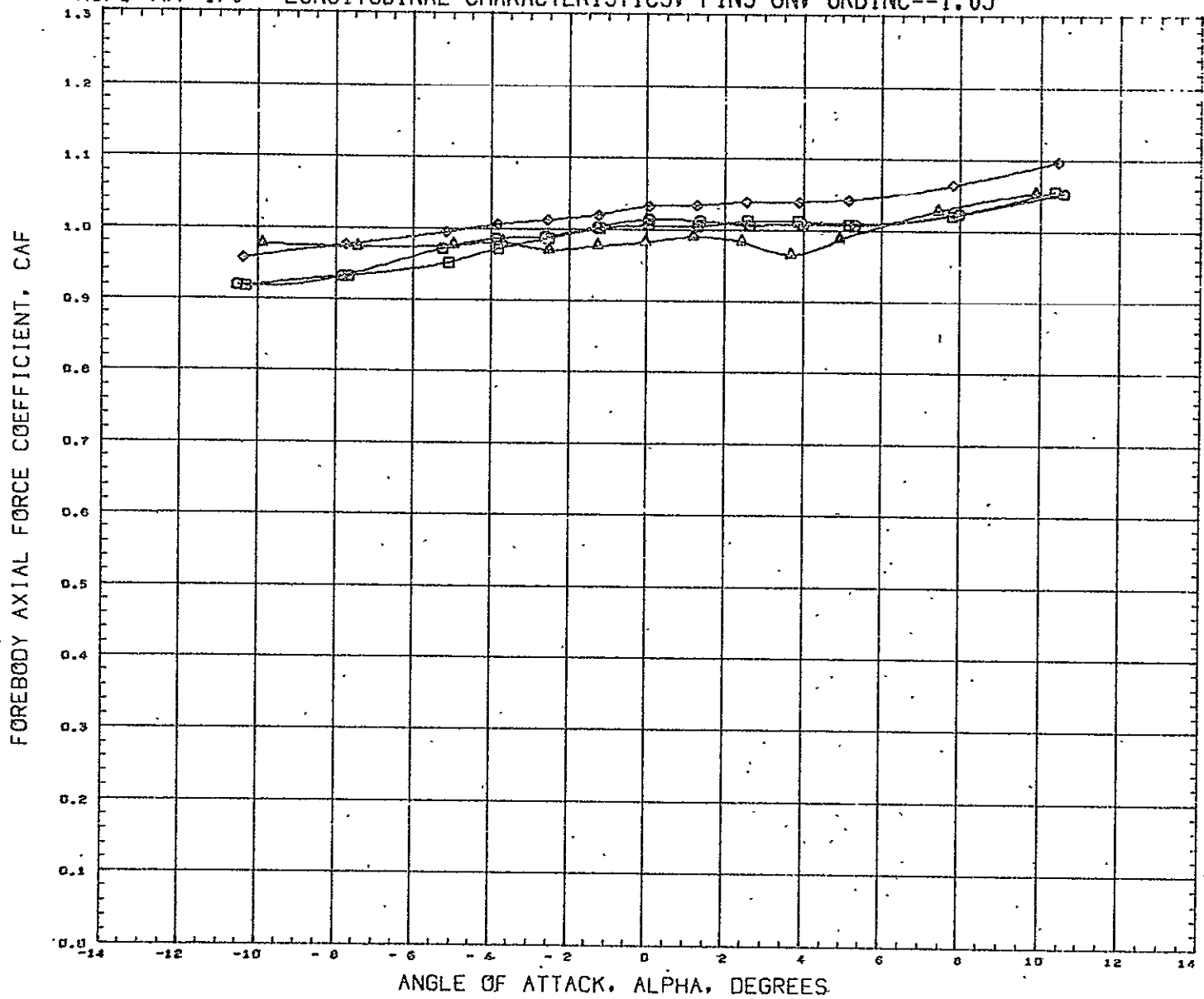
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TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-1.05

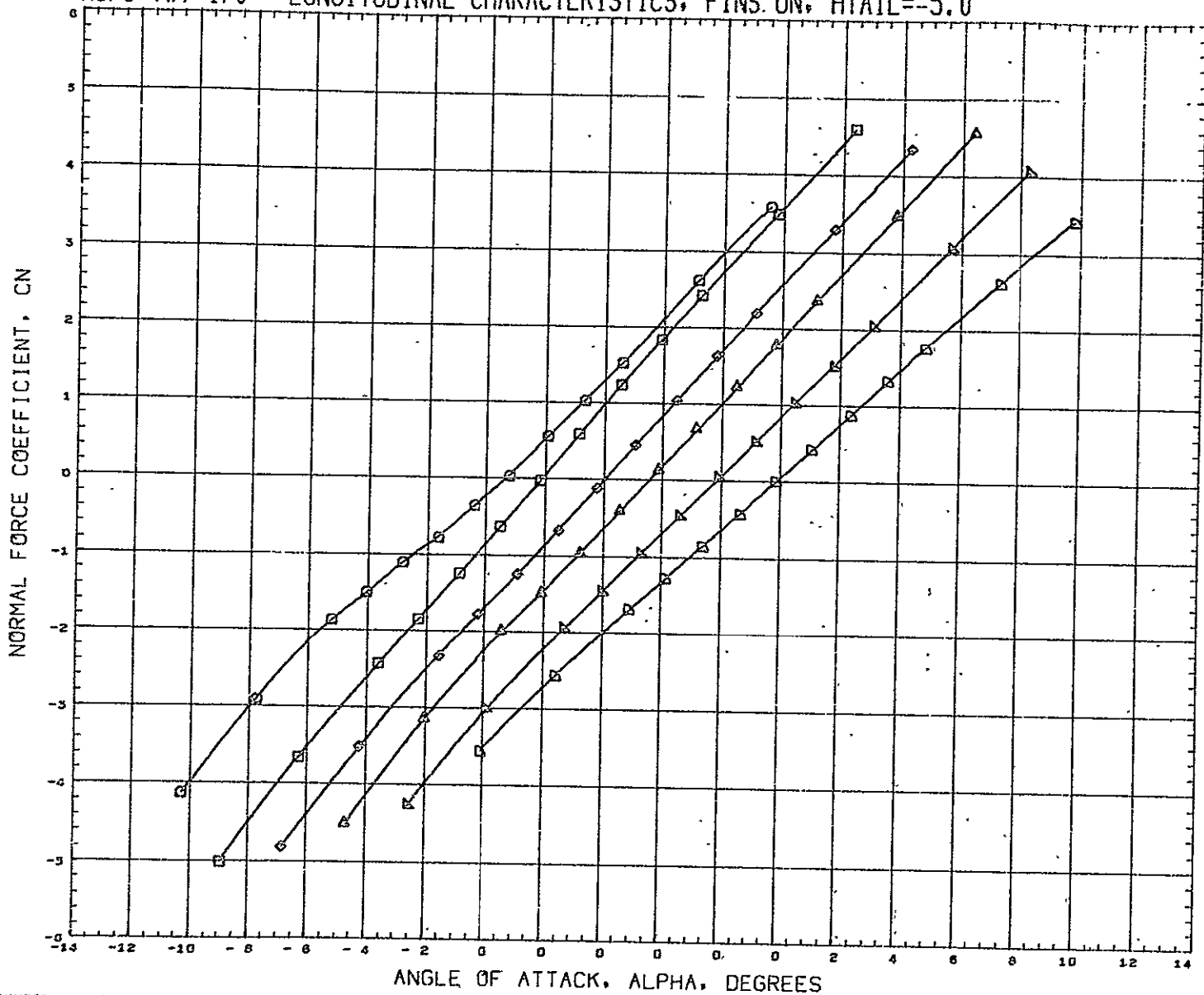


SYMBOL	MACH	PARAMETRIC VALUES			
○	1.195	BETA	- 0.050	ORBINC	- 1.050
□	1.303	WNGINC	4.000	MTAIL	0.000
◇	1.456	PHIB	0.000		
△	1.987				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
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REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, HTAIL=-5.0



SYMBOL	MACH	PARAMETRIC VALUES			
□	0.893	BETA	- 0.020	ORBINC	- 1.050
◇	0.995	WNGIRC	4.000	HTAIL	- 5.000
△	1.093	PHIB	0.000		
▽	1.193				
◇	1.454				
□	1.961	DATA HIST. CODE	*A		

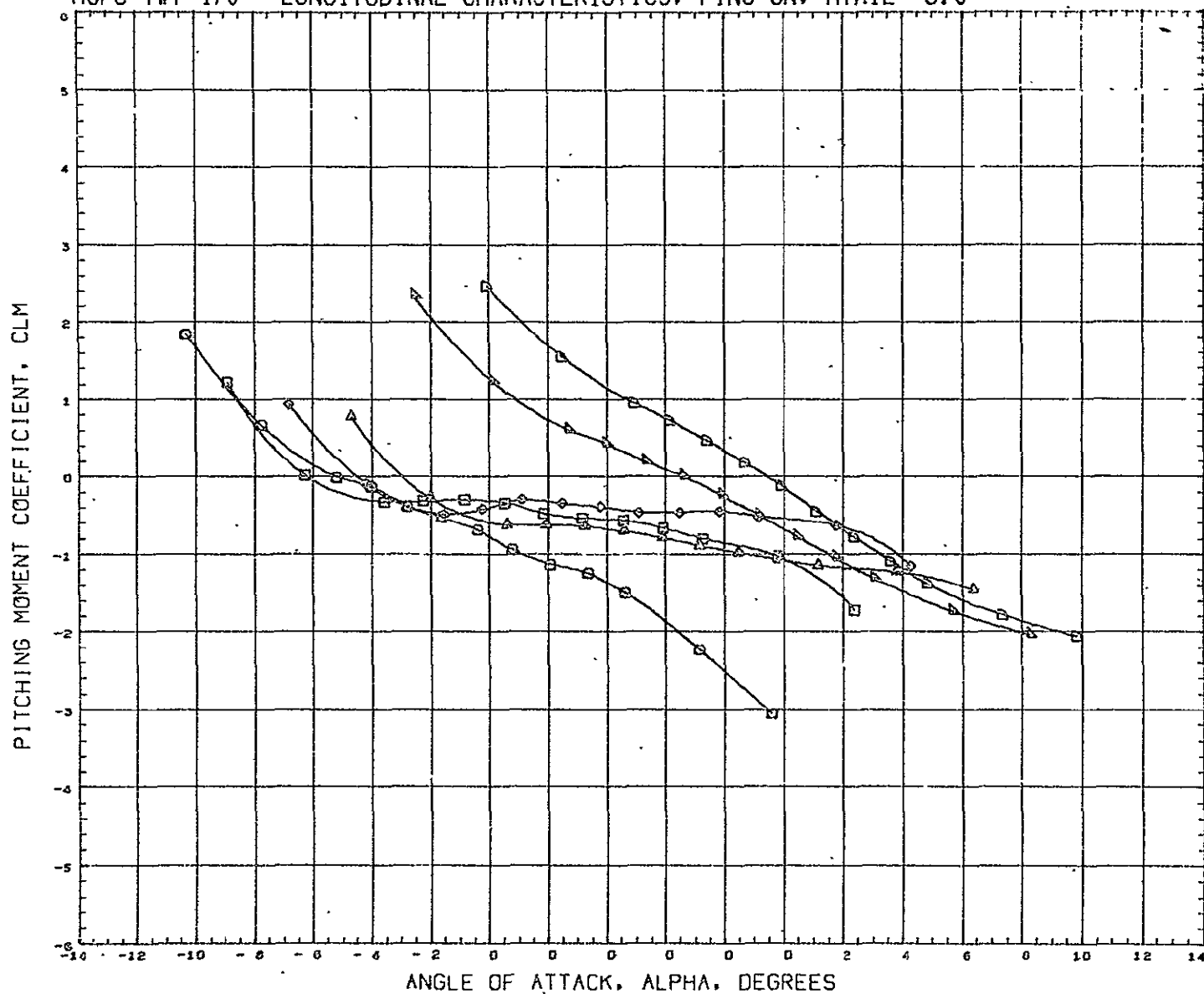
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REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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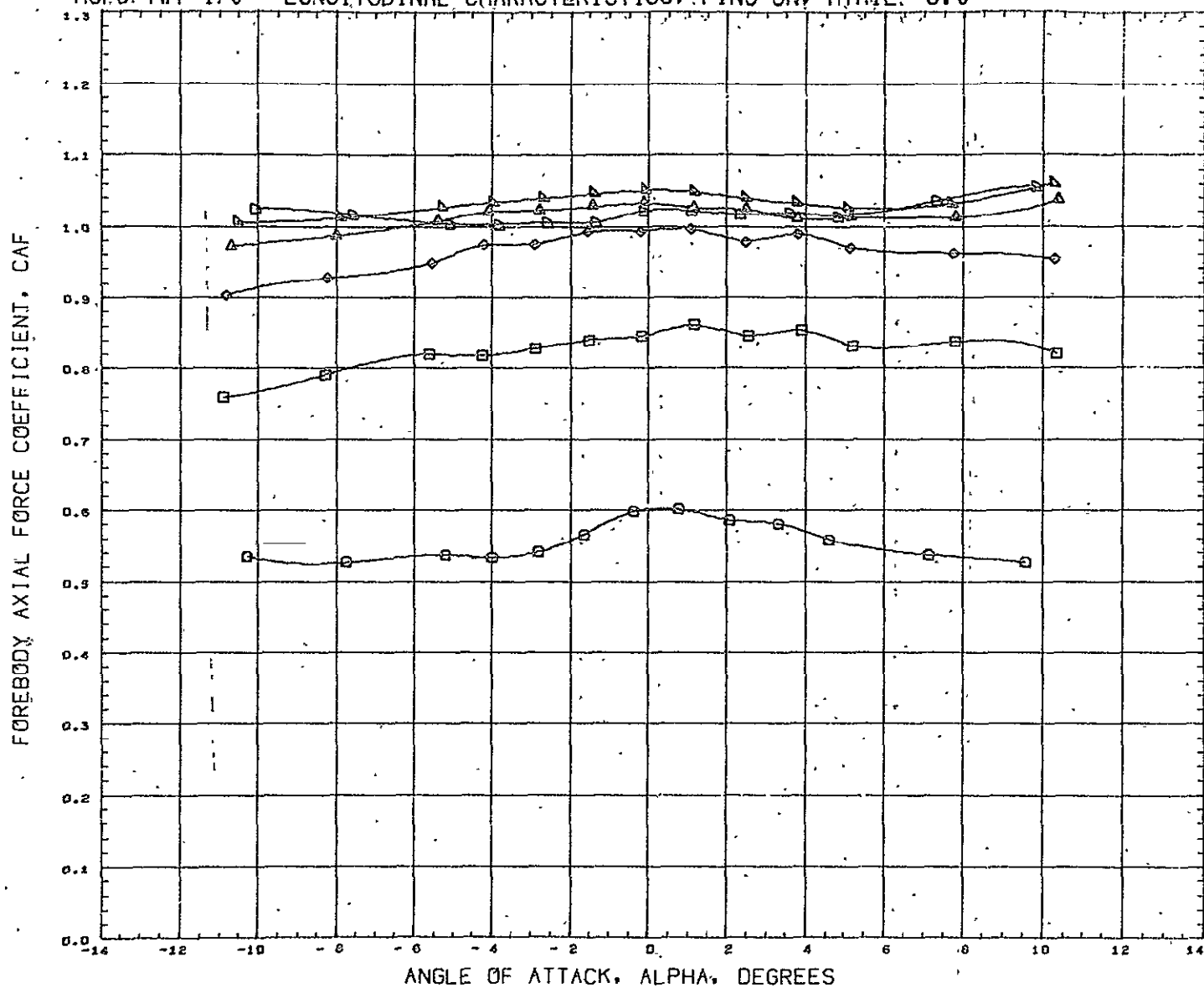
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, HTAIL=-5.0



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.093	DETA	- 0.020	ORDINC	- 1.050
□	0.993	WNGINC	4.000	HTAIL	- 5.000
◇	1.093	PHIB	0.000		
△	1.193				
▽	1.434				
D	1.961	DATA HIST. CODE	#A		

REFERENCE INFORMATION		
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REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSEC: TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, HTAIL=-5.0



SYMBOL	NACH	PARAMETRIC VALUES			
○	0.993	BETA	- 0.020	ORBINC	- 1.050
□	0.995	WNGINC	4.000	HTAIL	- 5.000
◇	1.093	PHIB	0.000		
△	1.199				
▽	1.454				
D	1.961	DATA HIST. CODE	#A		

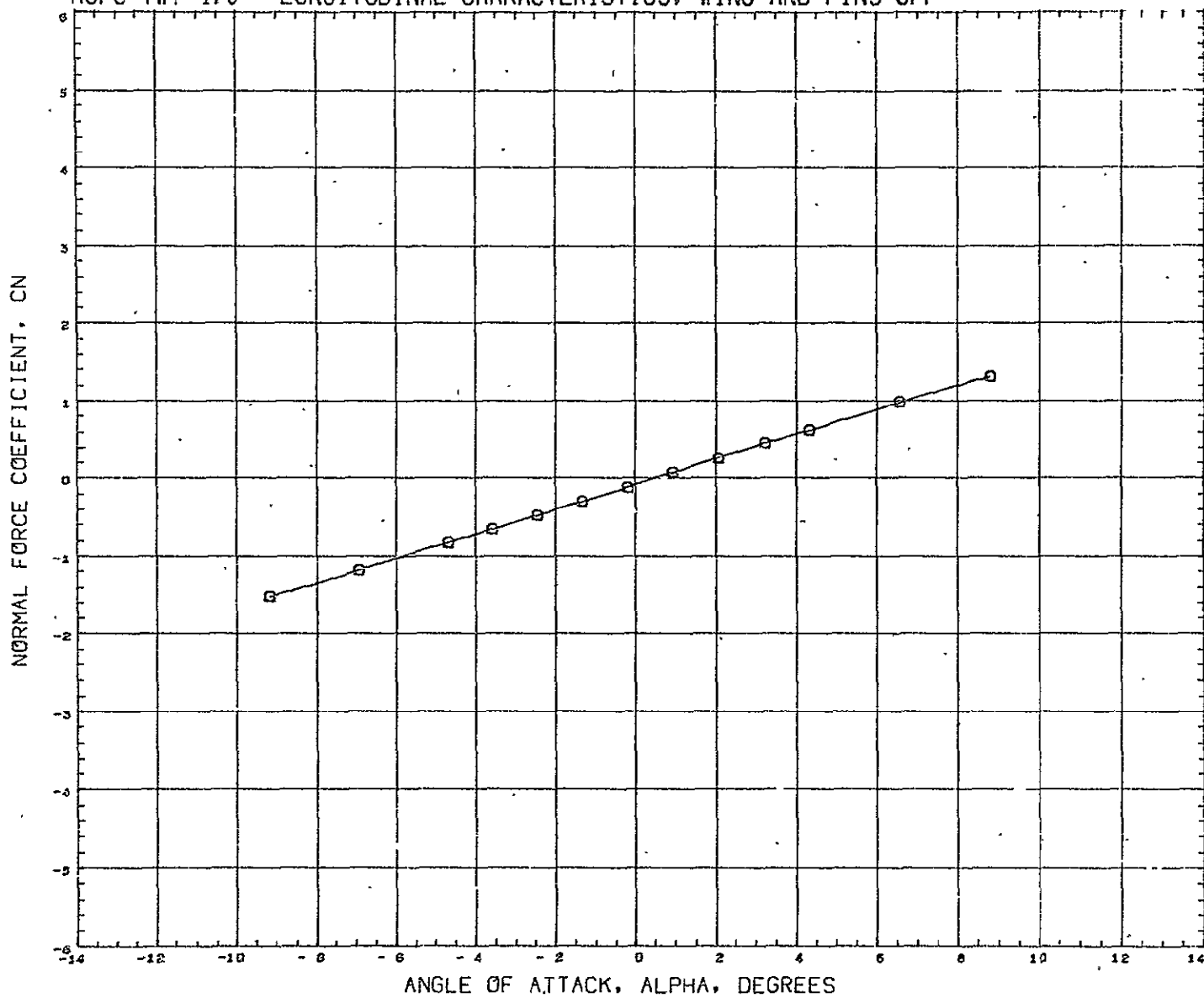
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REFB	1.3330	INCHES
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YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING AND FINS OFF



SYMBOL	MACH	PARAMETRIC VALUES			
□	0.995	BETA	- 0.100	ORBNIC	- 1.050
		HTAIL	0.000	PHIB	0.000

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

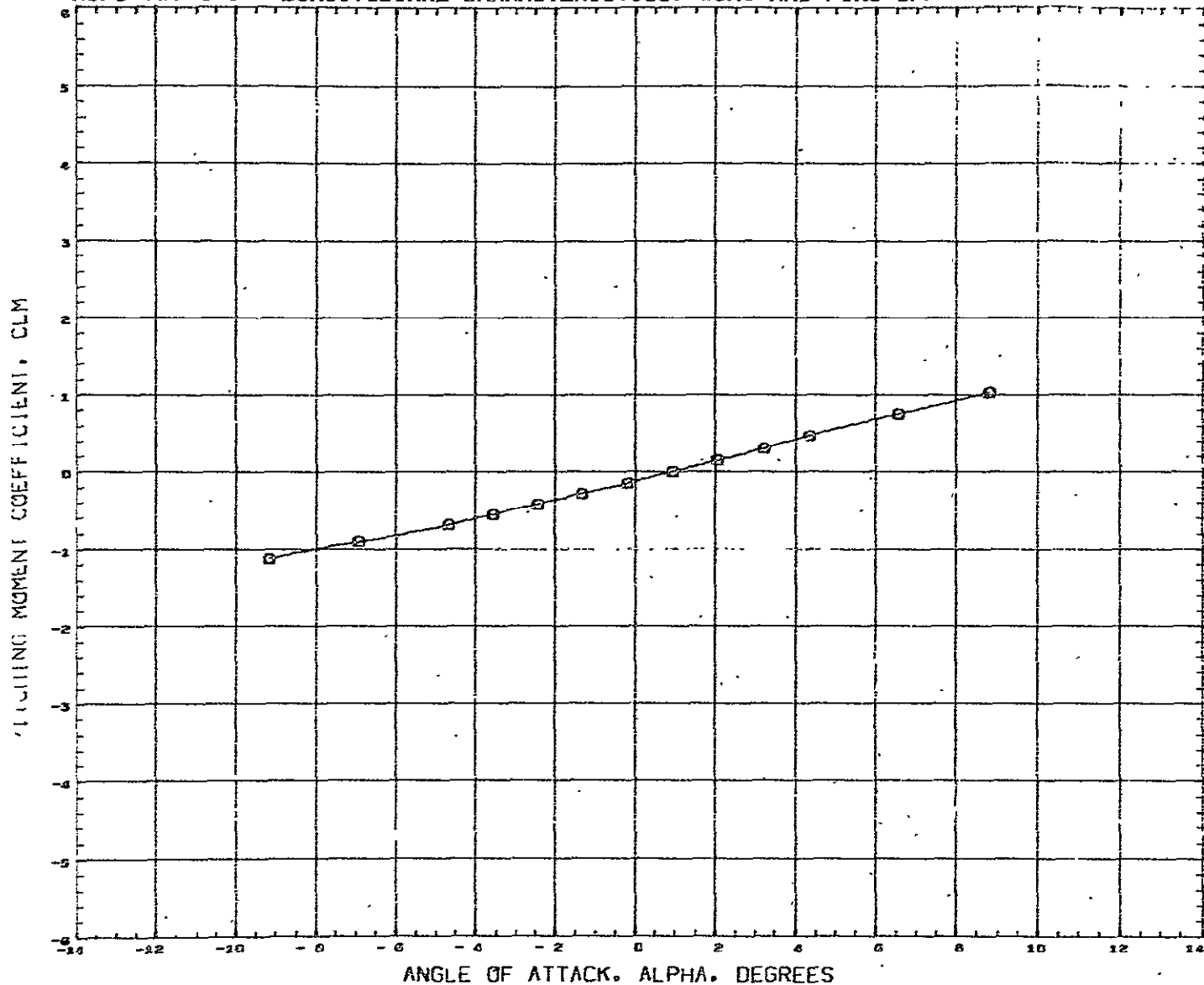
REFERENCE FILE

TWT470 S-1C/GAC ORBITER BOHVS

WING, FINS OFF (A24101) 26 JAN 71

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING AND FINS OFF



MSOL HACH
 0 0.995

PARAMETRIC VALUES
 BETA - 0.100 ORBINC - 1.050
 HTAIL 0.000 FNIS 0.000

REFERENCE FILE

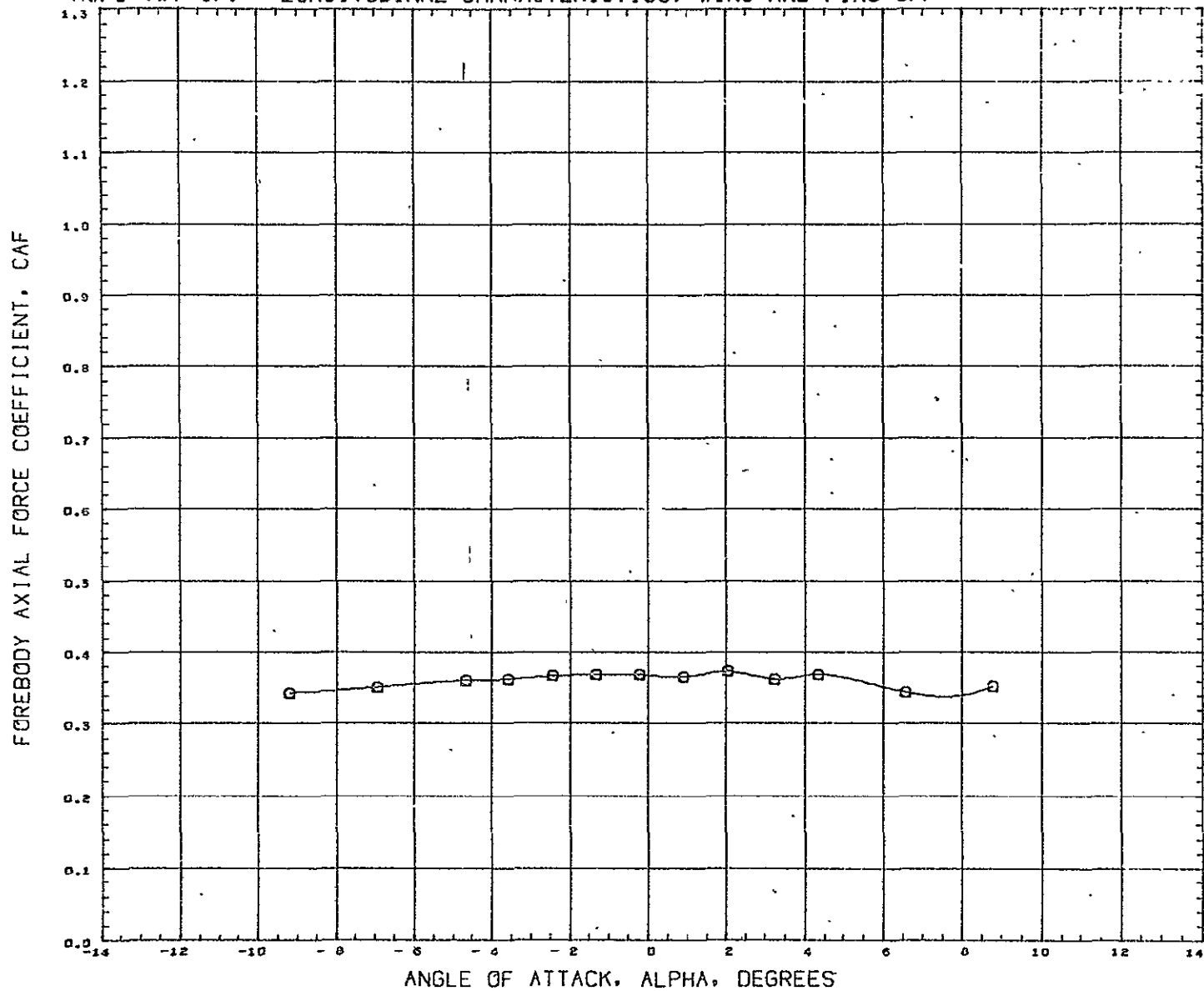
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 ZHRF 0.0000 INCHES
 SCALE 0.3366 PERCENT

WT470 S-IC/GAC ORBITER BOHVS

WING, FINS OFF (A24101) 26 JAN 71

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING AND FINS OFF

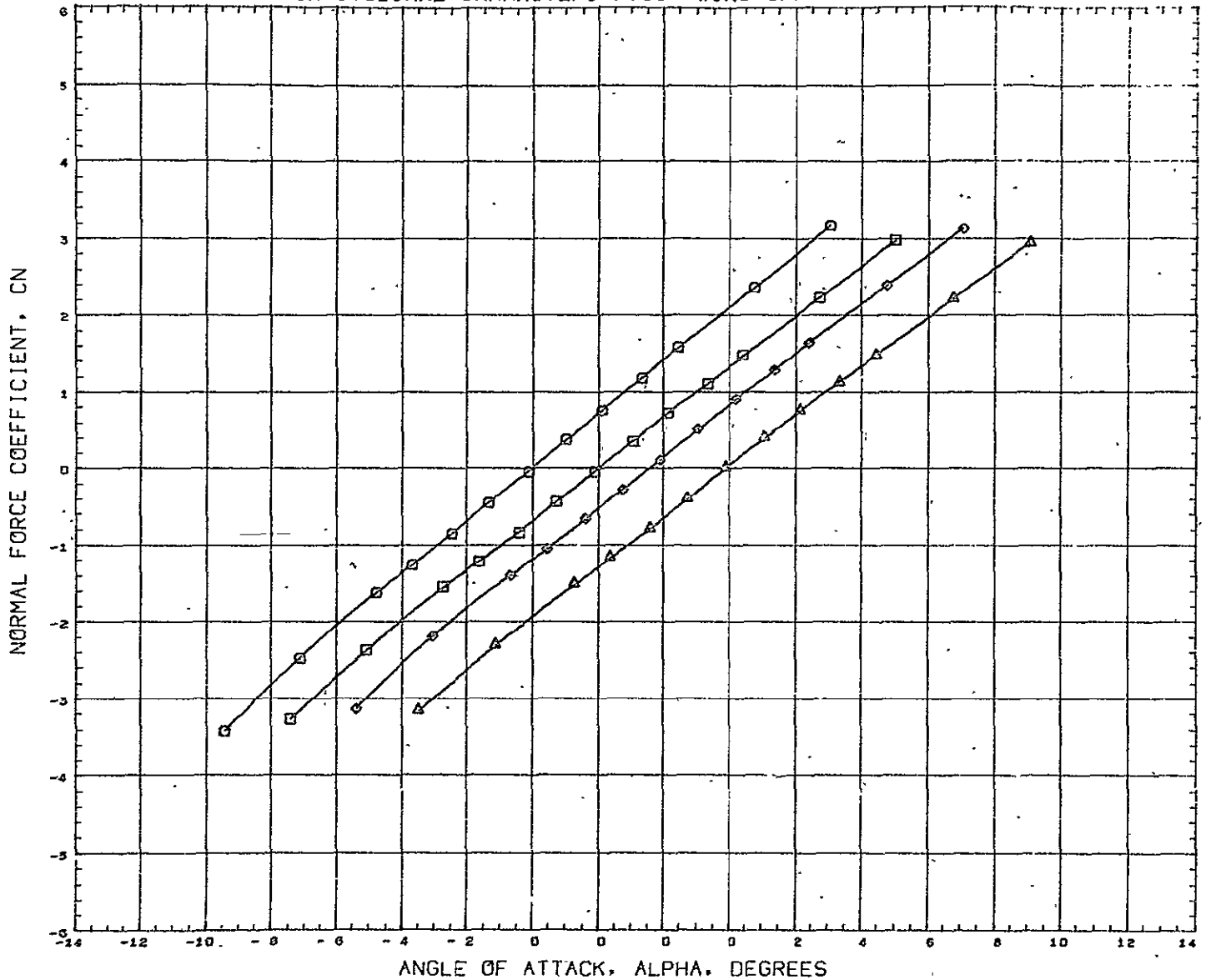


SYMBOL	HACH	PARAMETRIC VALUES			
Q	0.995	BETA	- 0.100	ORBINC	- 1.050
		MTAIL	0.000	PHIB	0.000

REFERENCE INFORMATION		
REFS	1.3960	90.1 IN.
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REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING OFF



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.999	BETA	- 0.100	ORBINC	- 1.050
□	1.102	NTAIL	0.000	PHIB	0.000
◇	1.195				
△	1.459				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
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YNRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

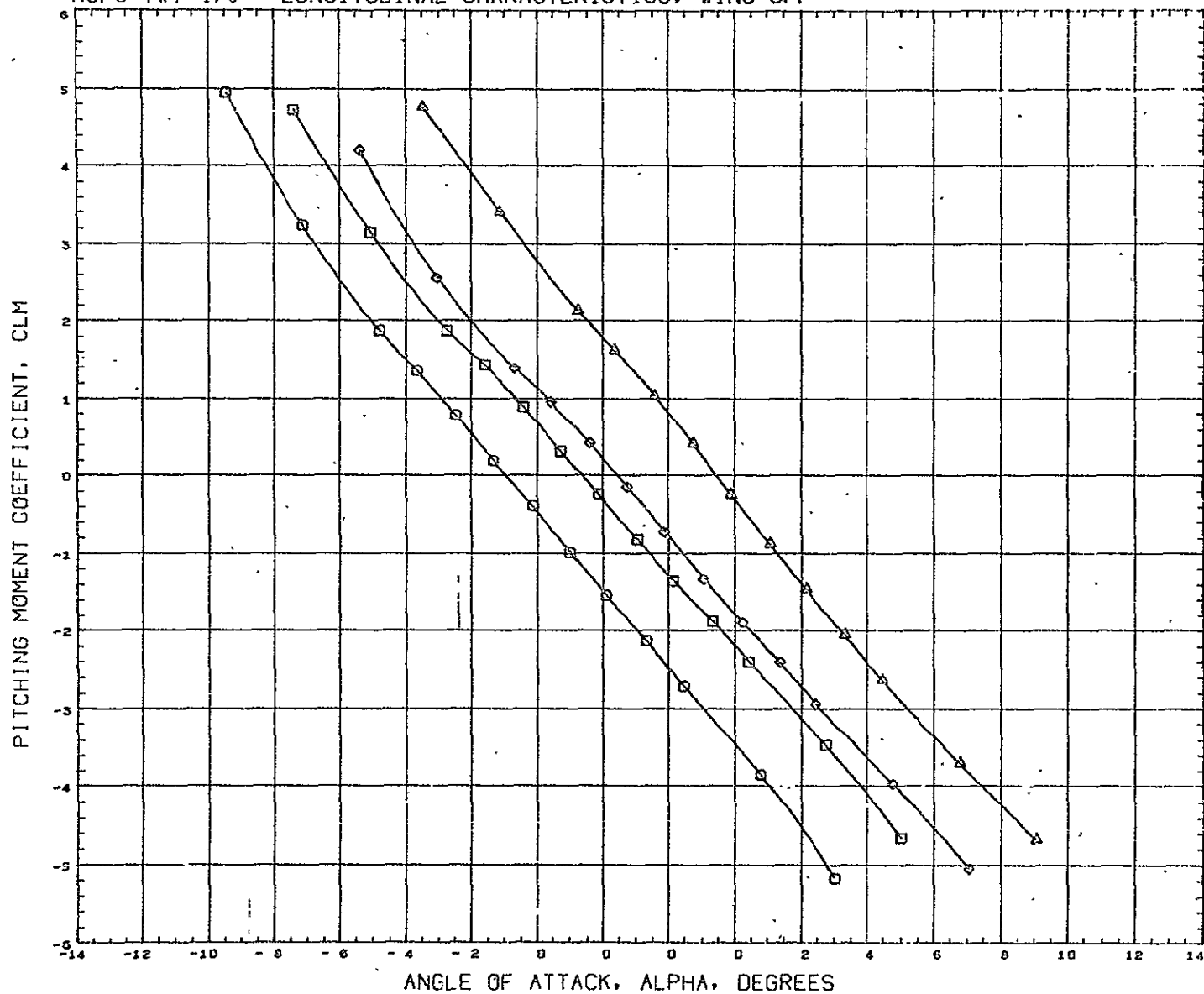
TWT470 S-IC/GAC ORBITER BF10HVS WING OFF

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING OFF

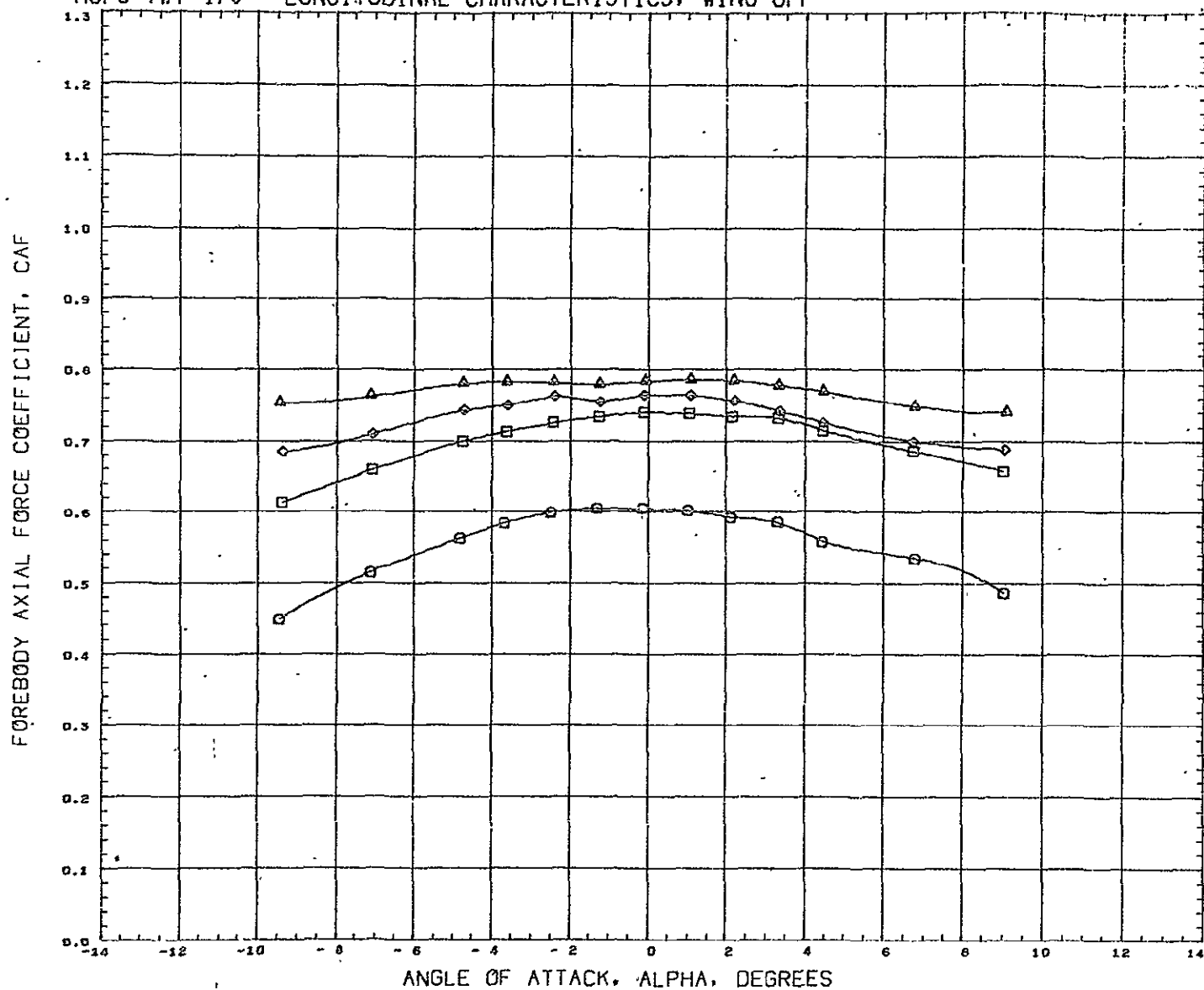


SYMBOL	MACH	PARAMETRIC VALUES			
○	0.999	BETA	- 0.100	ORBINC	- 1.050
□	1.102	HTAIL	0.000	PHIB	0.000
◇	1.195				
△	1.459				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SG. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING OFF



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.999	BETA	- 0.100	ORBIT	- 1.050
□	1.102	NTAIL	0.000	PHIB	0.000
◇	1.195				
△	1.459				

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

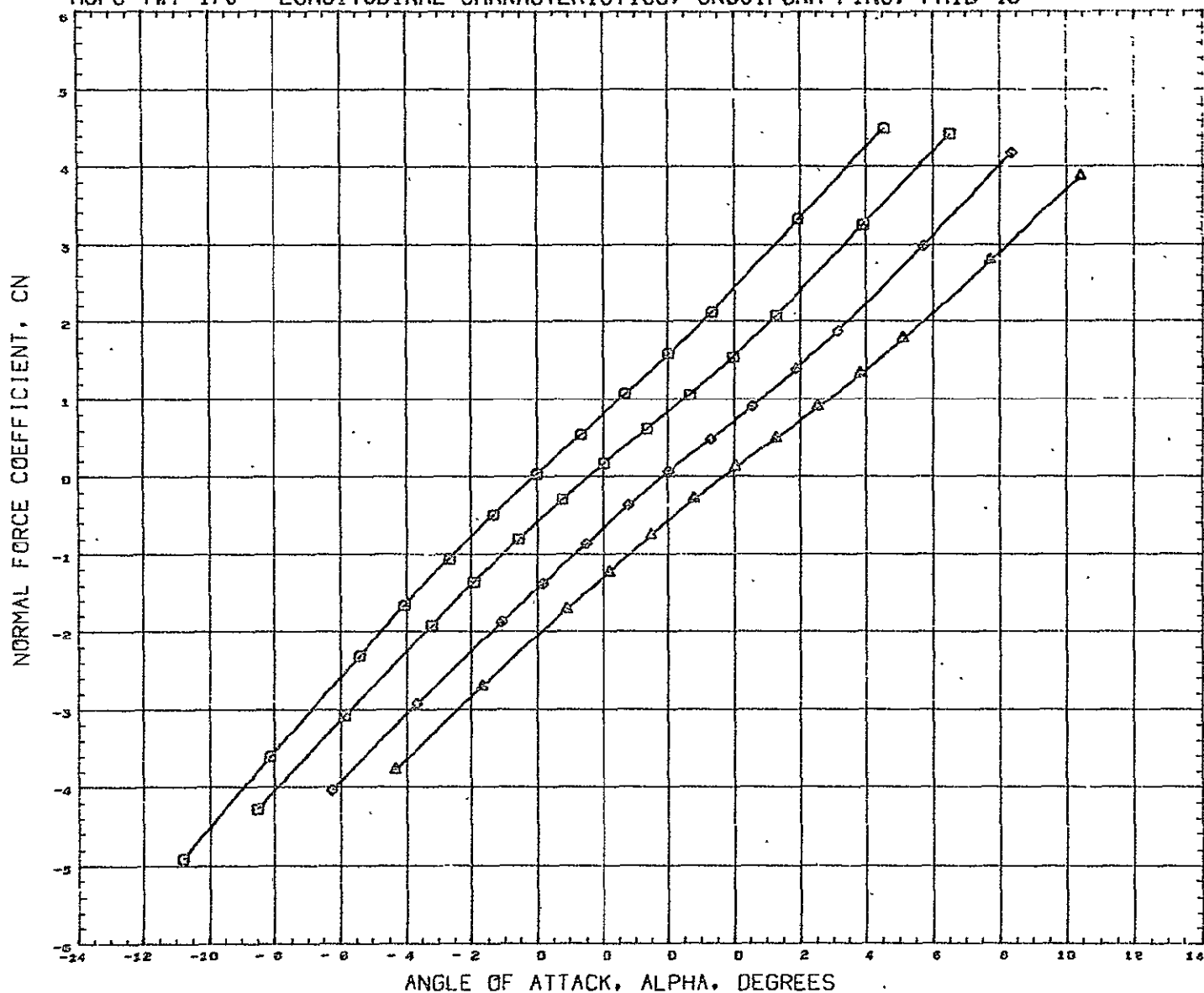
REFERENCE FILE

TWT470 S-IC/GAC ORBITER BF10HVS WING OFF

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=45

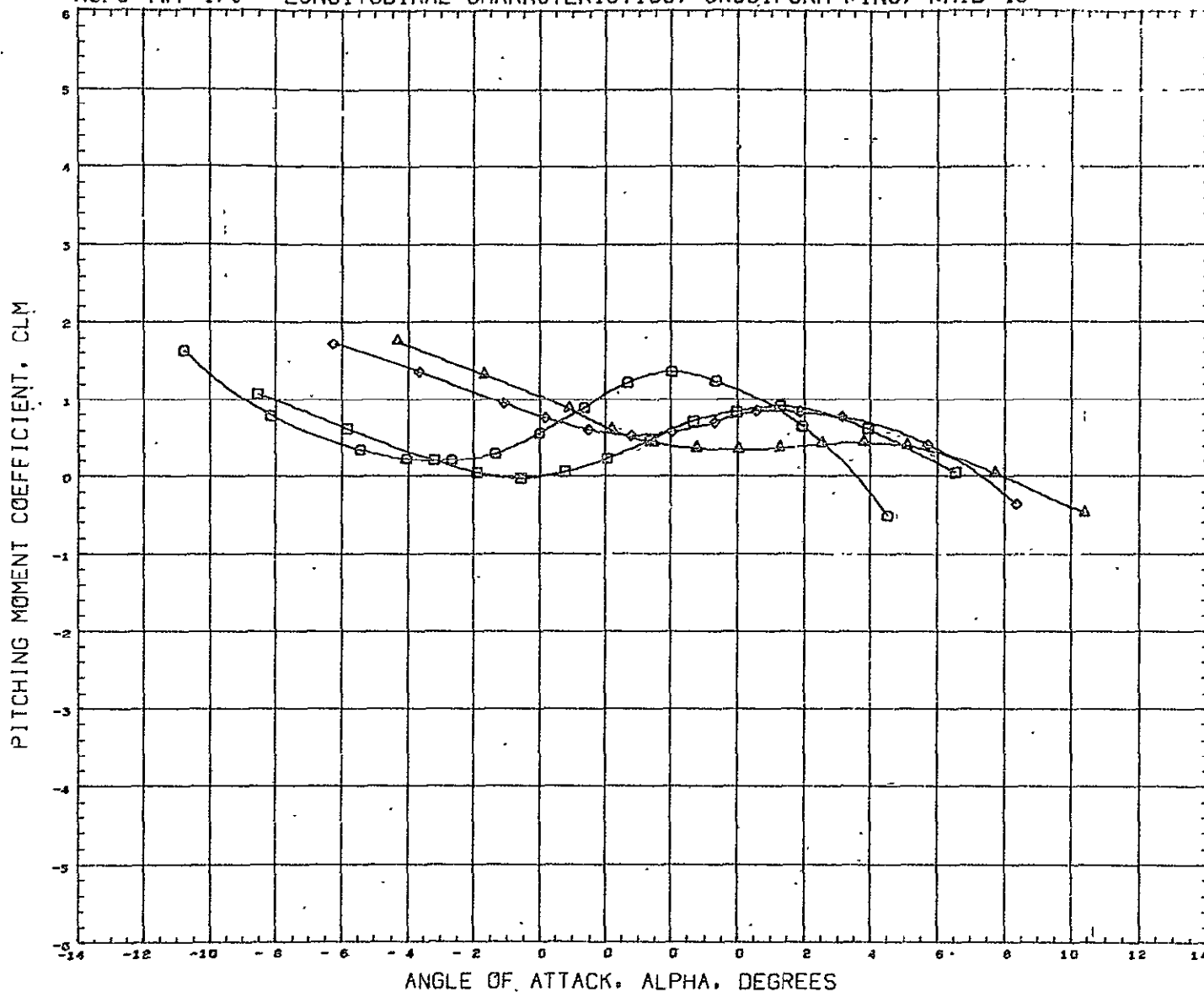


MSOL	MACH	PARAMETRIC VALUES			
□	1.006	BETA	0.070	ORBINC	1.050
◇	1.195	NRGINC	4.000	NTAIL	0.000
○	1.503	PHIB	45.000		
△	1.463				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YHRP	0.0000	INCHES
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SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=45

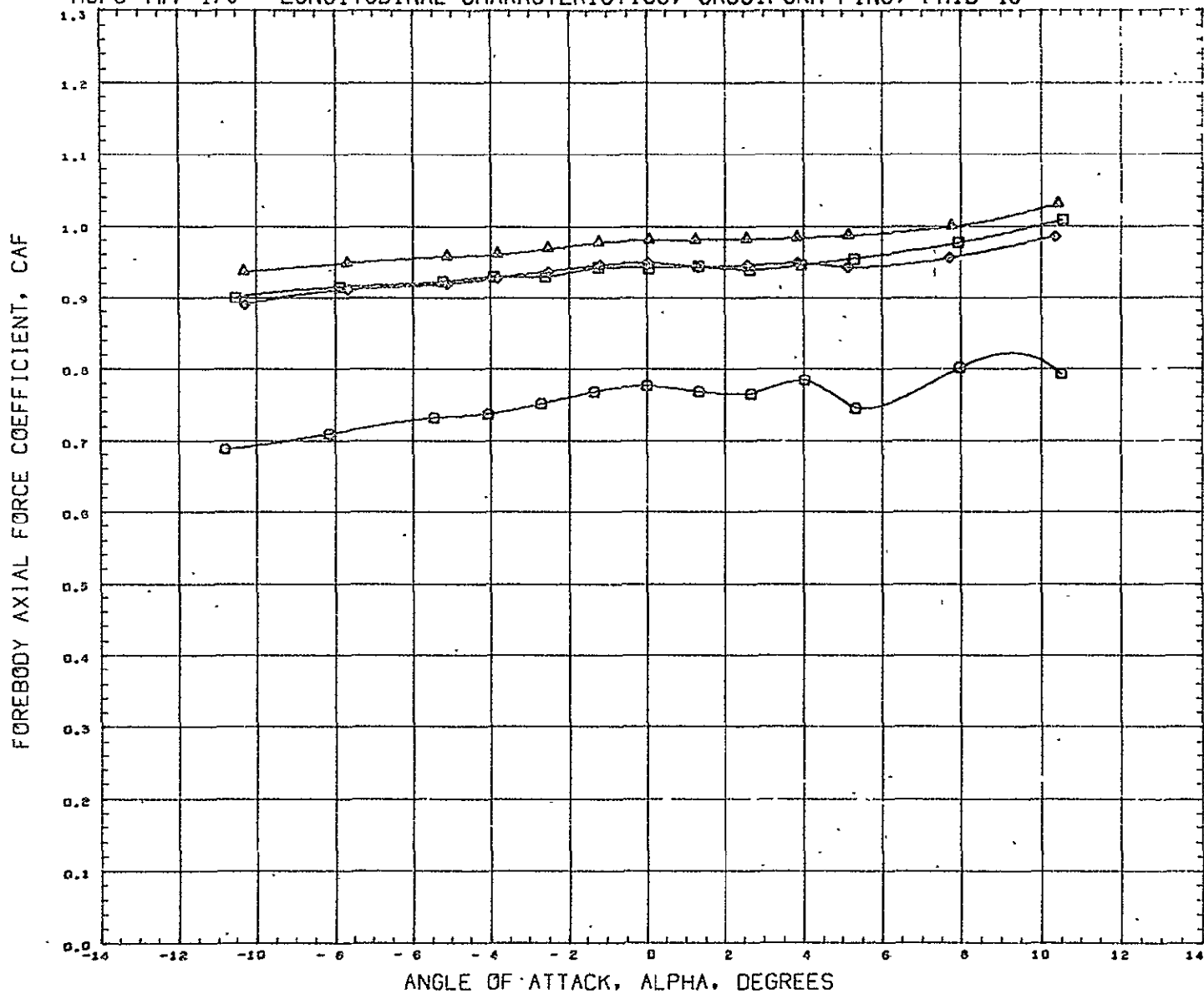


SYMBOL	MACH	PARAMETRIC VALUES			
□	1.008	BETA	- 0.070	ORBINC	- 1.050
◇	1.195	WNGINC	4.000	HTAIL	0.000
○	1.303	PHIB	45.000		
△	1.463				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
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REFD	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=45.

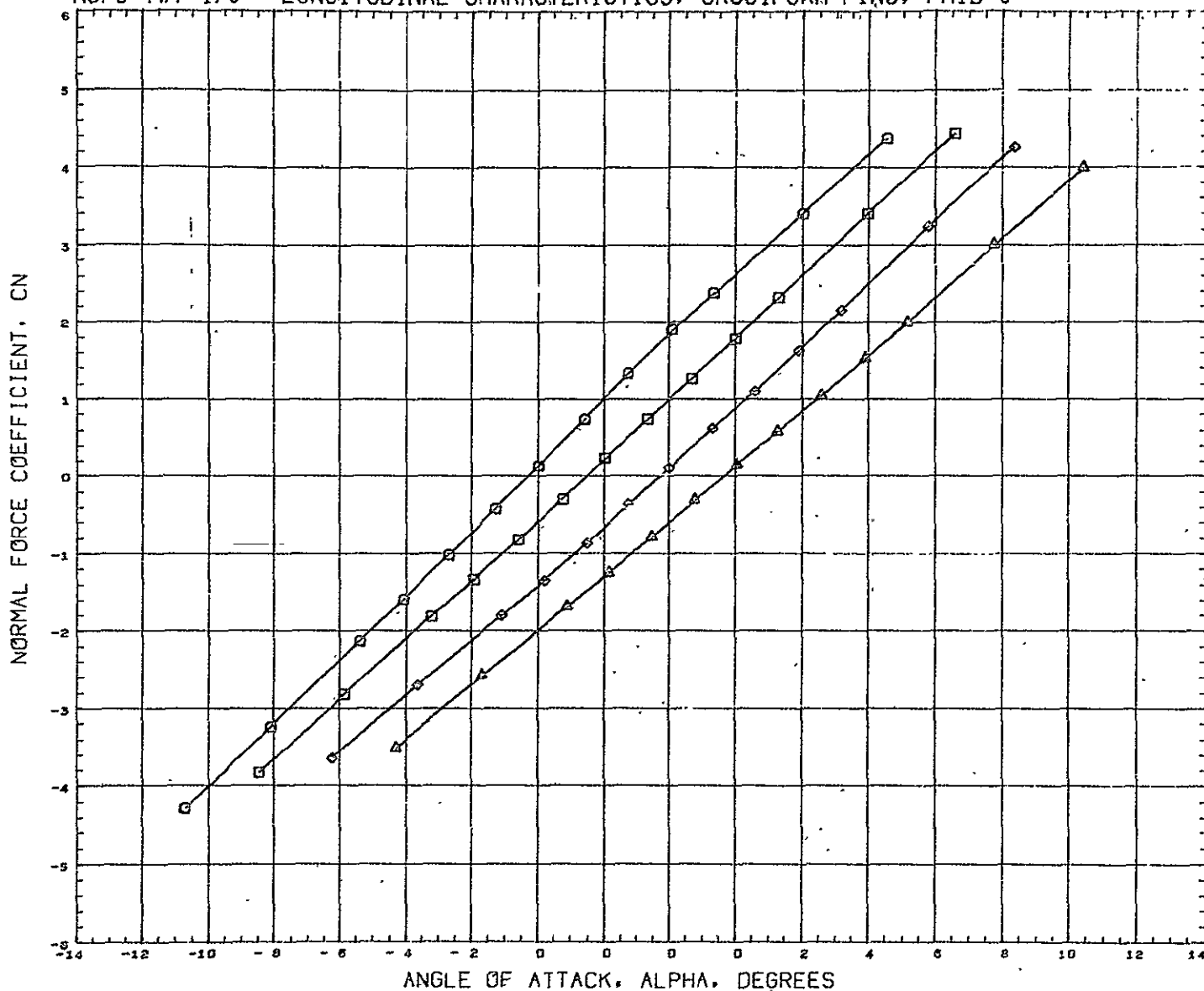


SYMBOL	MACH	PARAMETRIC VALUES			
○	1.006	BETA	- 0.070	ORBINC	- 1.050
□	1.195	WNGINC	4.000	HTAIL	0.000
◇	1.303	PHIB	45.000		
△	1.463				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	50. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=0



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.997	BETA	- 0.060	ORBINC	- 1.050
□	1.198	WINGINC	4.000	HTAIL	0.000
◇	1.303	PHIB	0.000		
△	1.459				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	50. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRF	5.2640	INCHES
YHRF	0.0000	INCHES
ZHRF	0.0000	INCHES
SCALE	0.3366	PERCENT

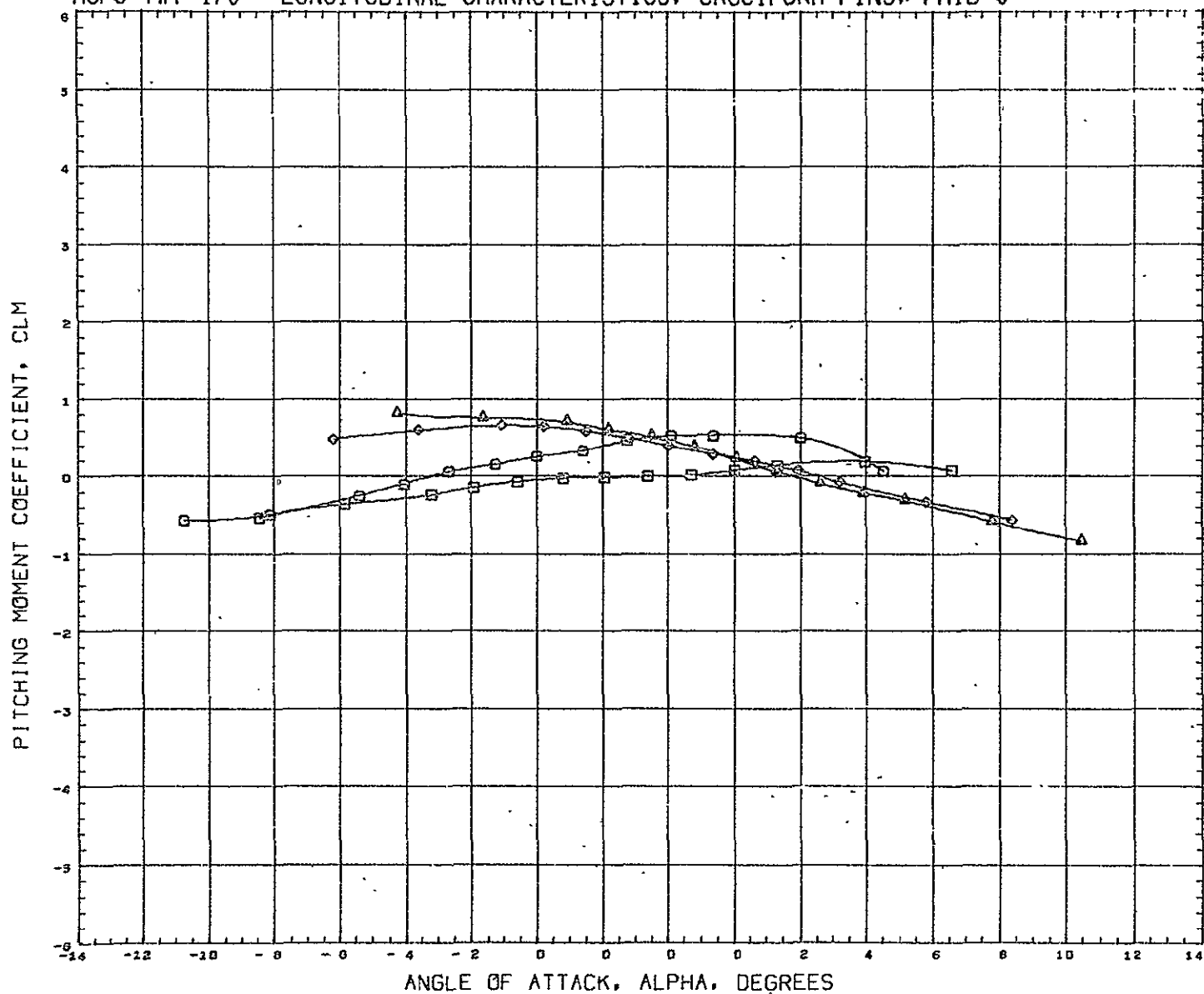
TWT470 S-IC/GAC ORBITER BF20WHVS PHIB = 0

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=0

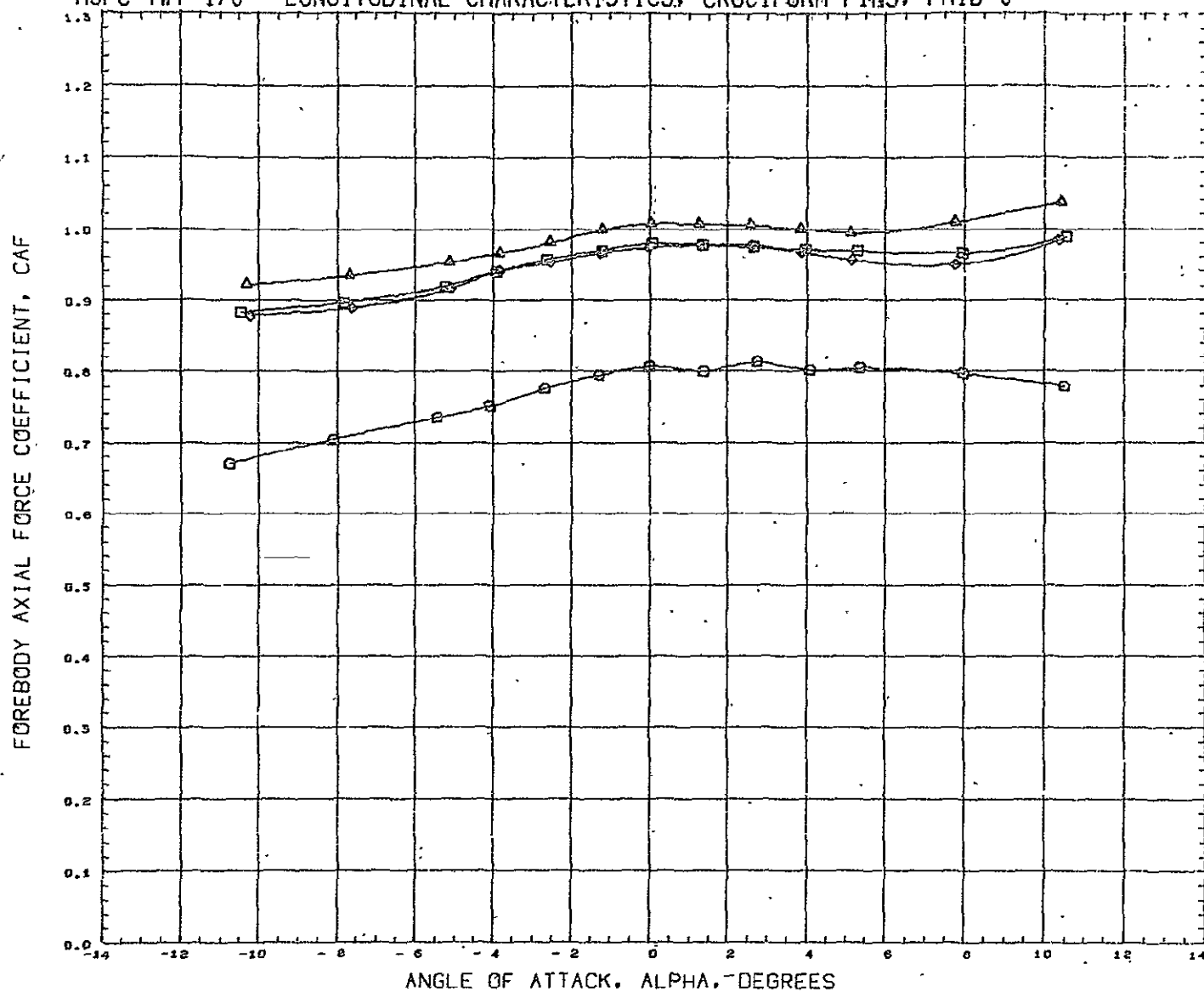


SYMBOL	MACH	PARAMETRIC VALUES
□	0.997	BETA - 0.060 ORBINC - 1.050
◇	1.198	WINGINC 4.000 HTAIL 0.000
○	1.303	PHIB 0.000
△	1.455	

REFERENCE INFORMATION		
REFS	1.3960	SG. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=0



SYMBOL	NACH	PARAMETRIC VALUES			
○	0.997	BETA	- 0.060	ORBINC	- 1.030
□	1.198	WINGINC	4.000	HTAIL	0.000
◇	1.303	PHIB	0.000		
△	1.433				

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

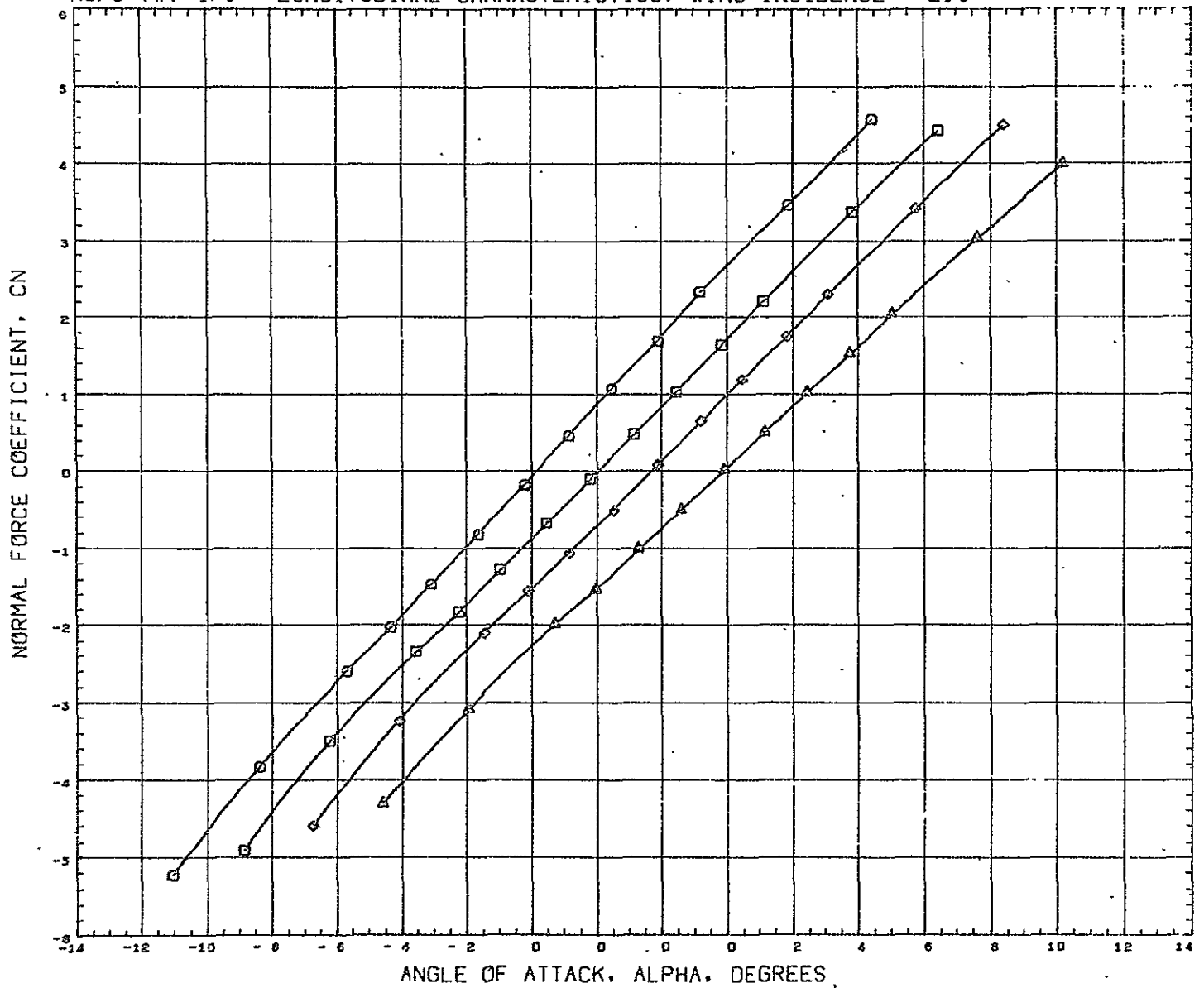
REFERENCE FILE

TWT470 S-IC/GAC ORBITER BF20WHVS PHIB = 0

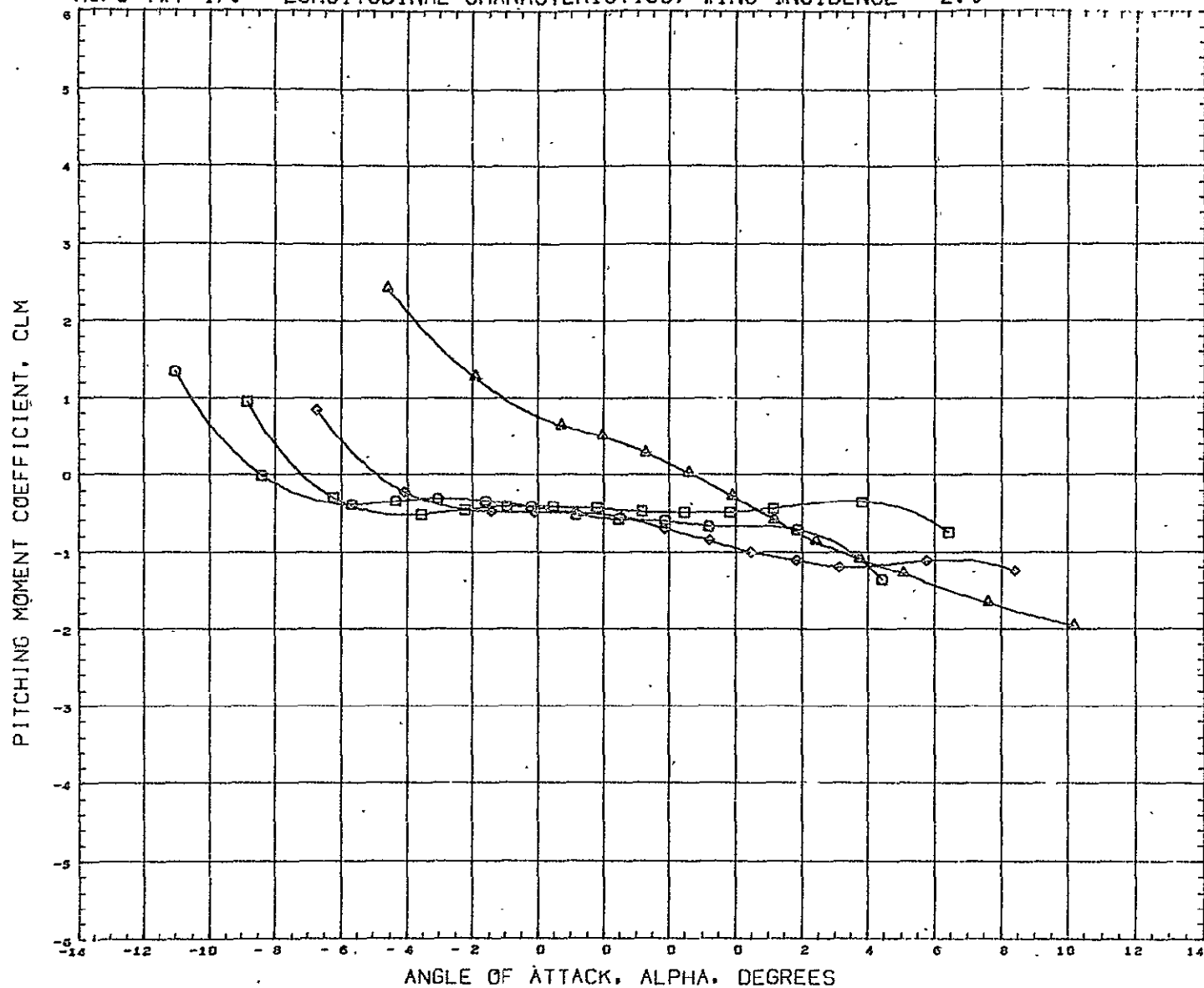
(A24131) 26 JAN 71

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING INCIDENCE = 2.0



MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING INCIDENCE = 2.0

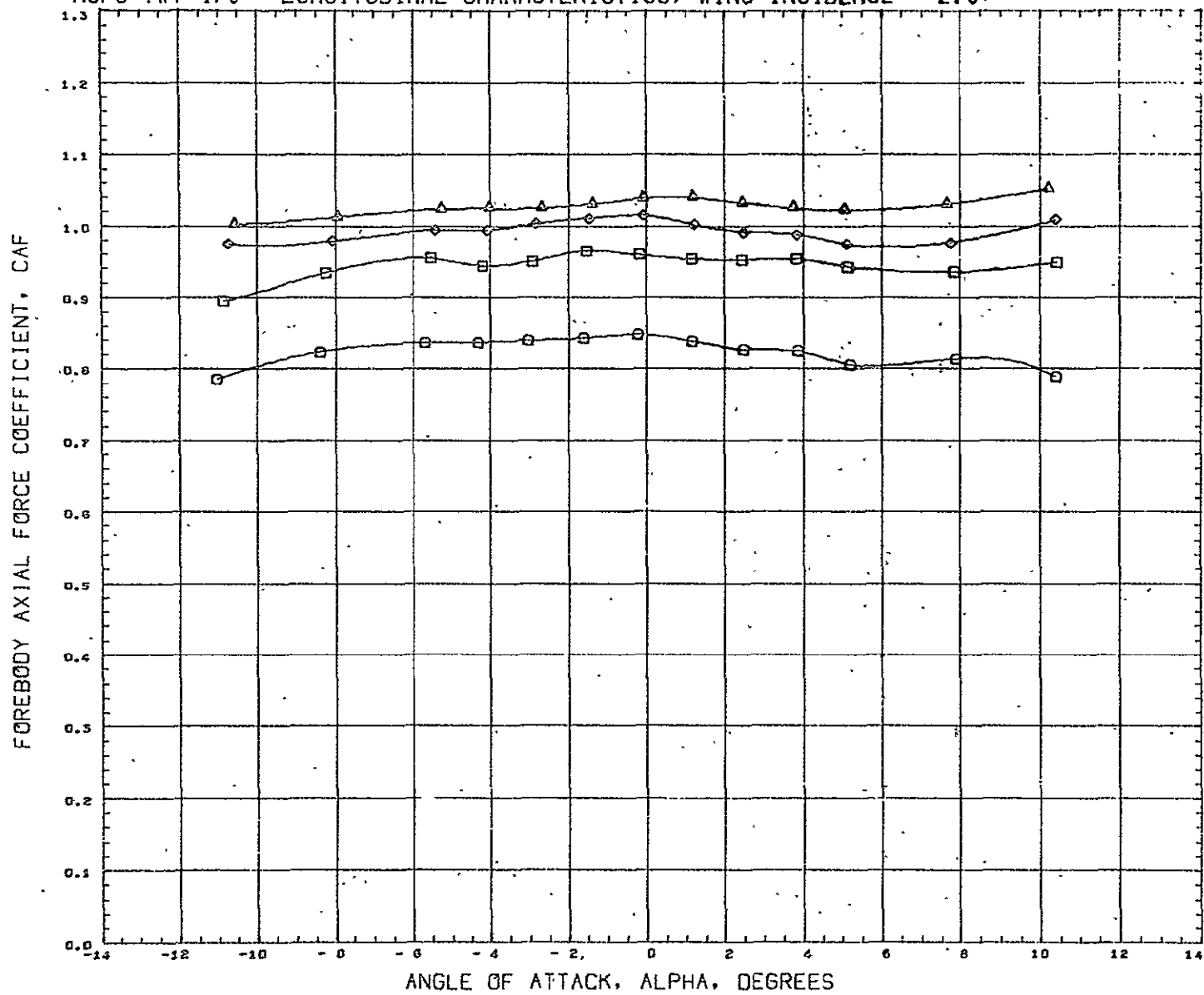


SYMBOL	MACH	PARAMETRIC VALUES			
○	1.001	BETA	- 0.090	ORBINC	- 1.050
□	1.091	WINGINC	2.000	HTAIL	0.000
◇	1.202	PHIB	0.000		
△	1.456				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING INCIDENCE = 2.0.

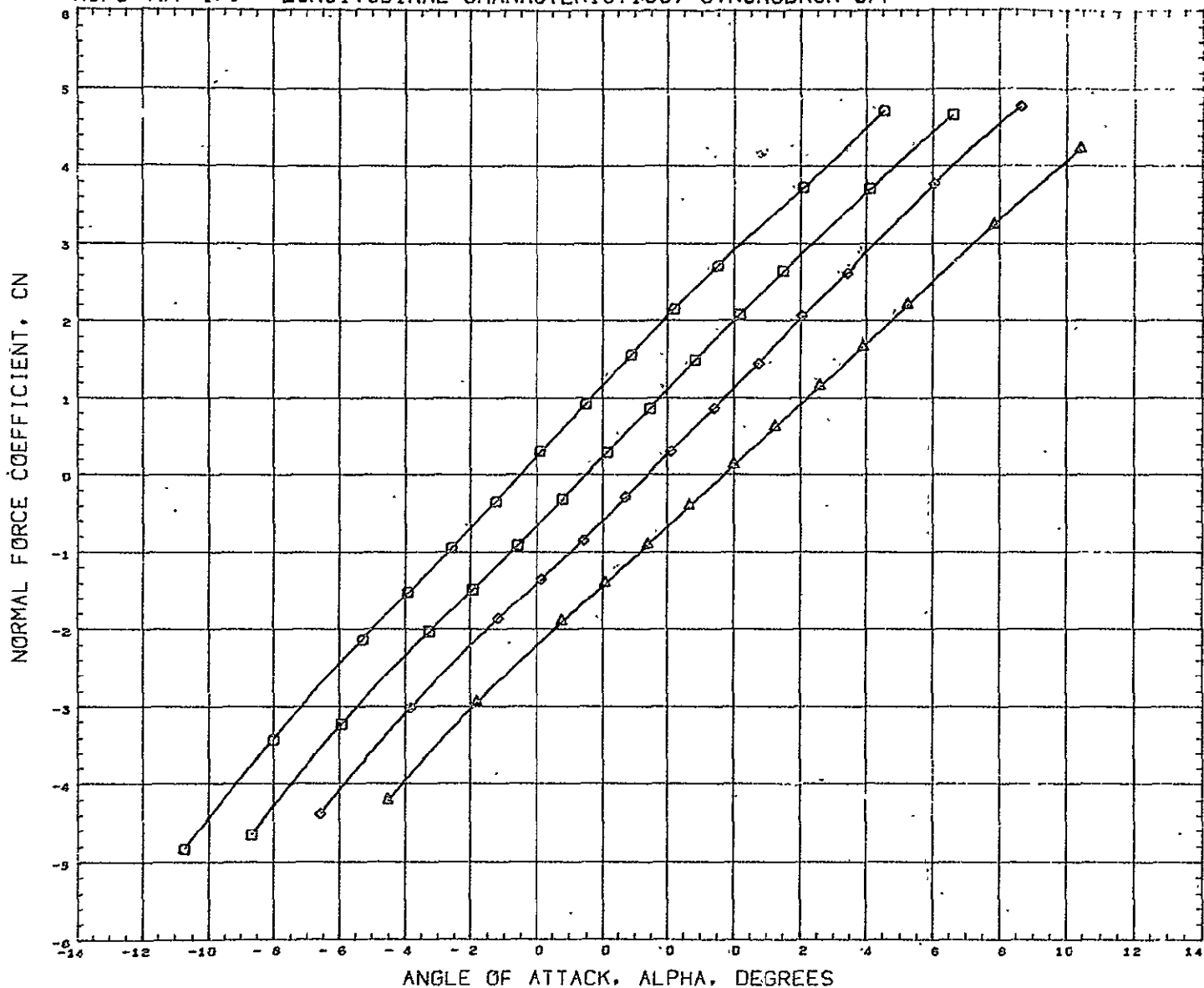


SYMBOL	NACH	PARAMETRIC VALUES			
○	1.001	BETA	- 0.090	ORBITC	- 1.050
□	1.091	WINGINC	2.000	HTAIL	0.000
◇	1.202	PHIB	0.000		
△	1.456				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC-TWT 470 LONGITUDINAL CHARACTERISTICS, STRONGBACK OFF

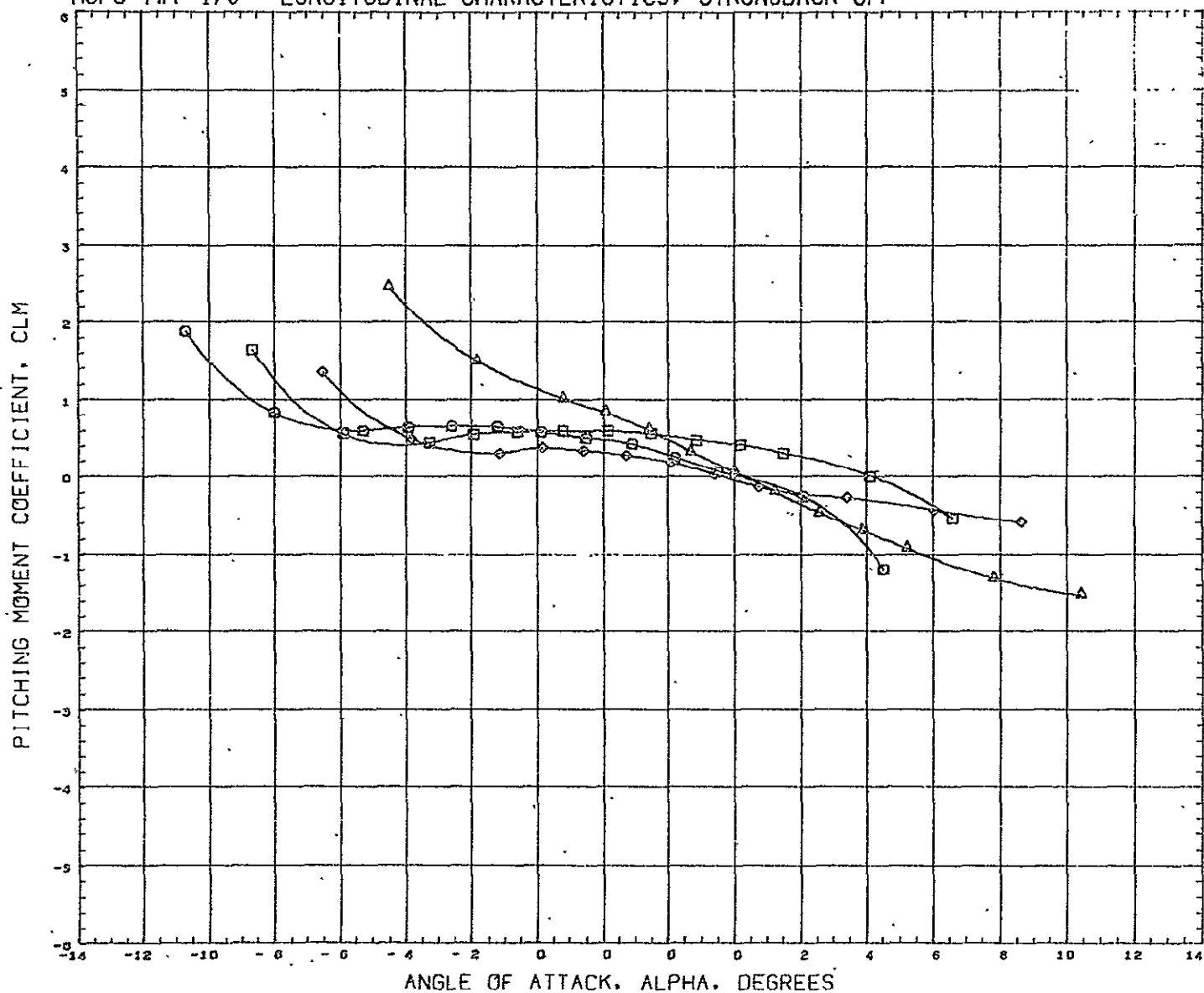


SYMBOL	MACH	PARAMETRIC VALUES			
□	1.002	BETA	- 0.040	ORBINC	- 1.050
◇	1.099	WNGINC	4.000	MTAIL	0.000
◊	1.200	PHIB	0.000		
△	1.400				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	50.1N.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, STRONGBACK OFF

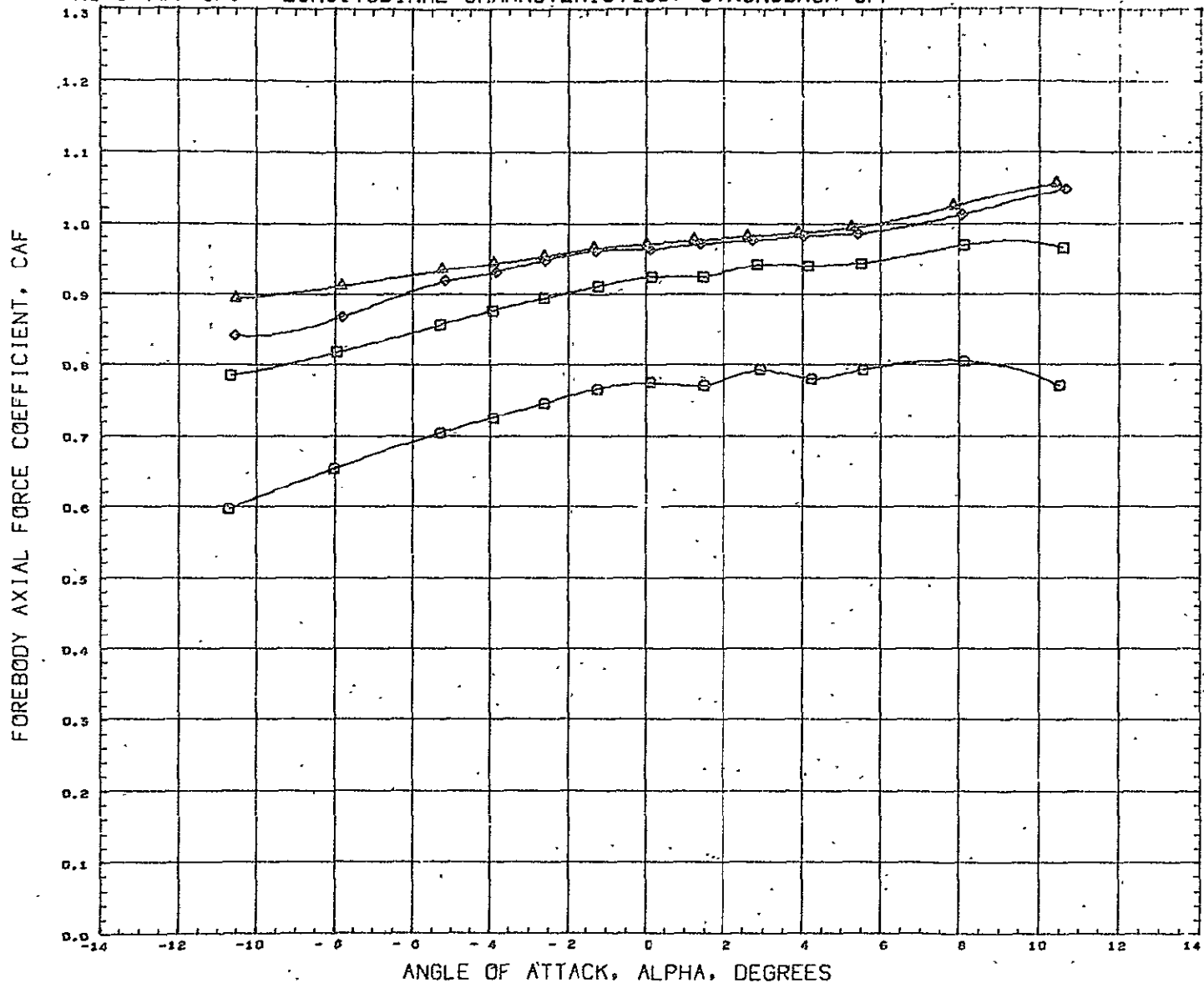


SYMBOL	MACH	PARAMETRIC VALUES			
○	1.002	BETA	- 0.040	ORBINC	- 1.050
□	1.099	W4GINC	4.000	MTAIL	0.000
◇	1.200	PHIS	0.000		
△	1.460				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470. LONGITUDINAL CHARACTERISTICS, STRONGBACK OFF

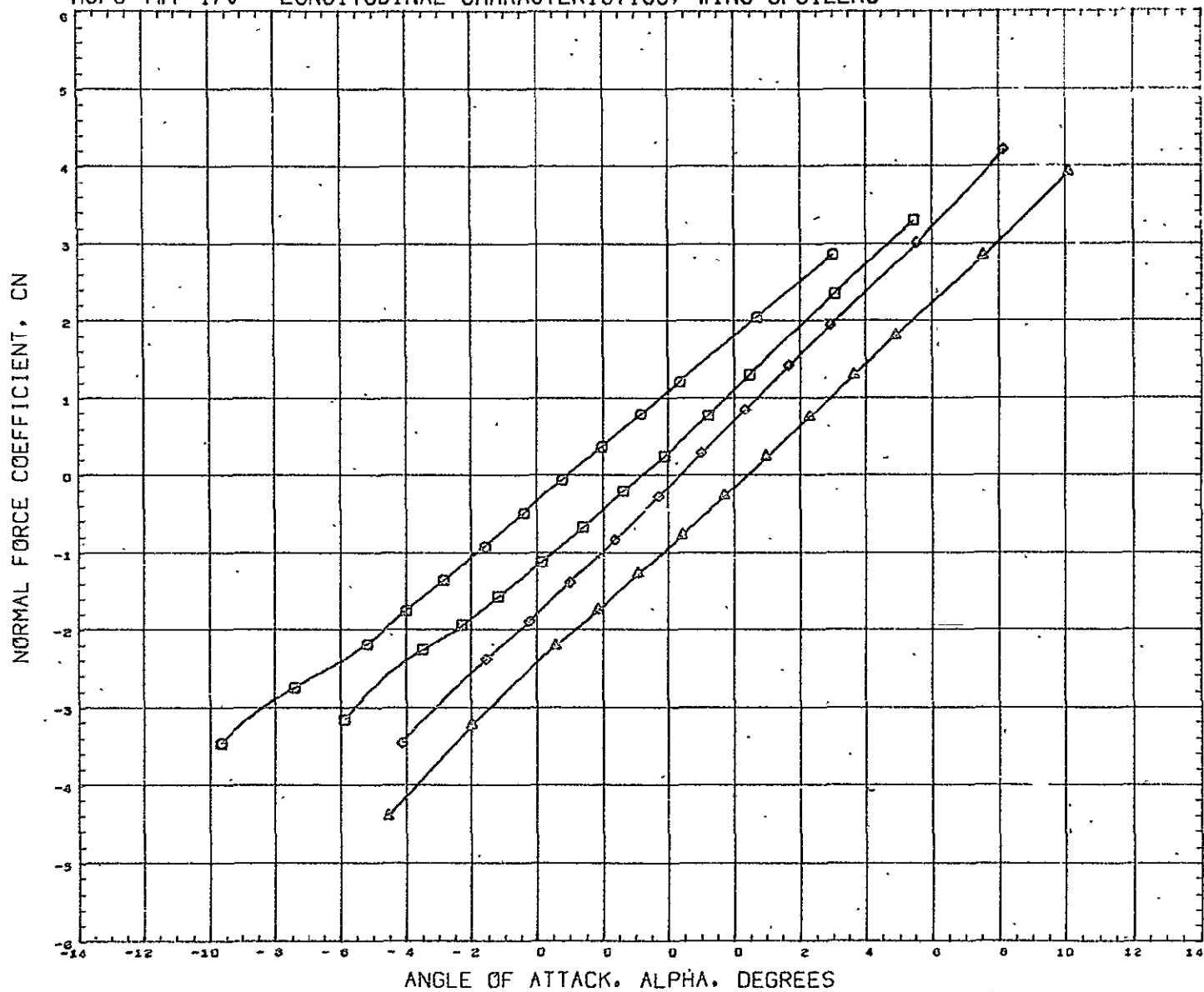


SYMBOL		MACH		PARAMETRIC VALUES	
○	1.002	BETA	0.040	ORBINC	- 1.050
□	1.099	WNGINC	4.000	HTAFL	0.000
◇	1.200	PHIB	0.000		
△	1.460				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING SPOILERS.

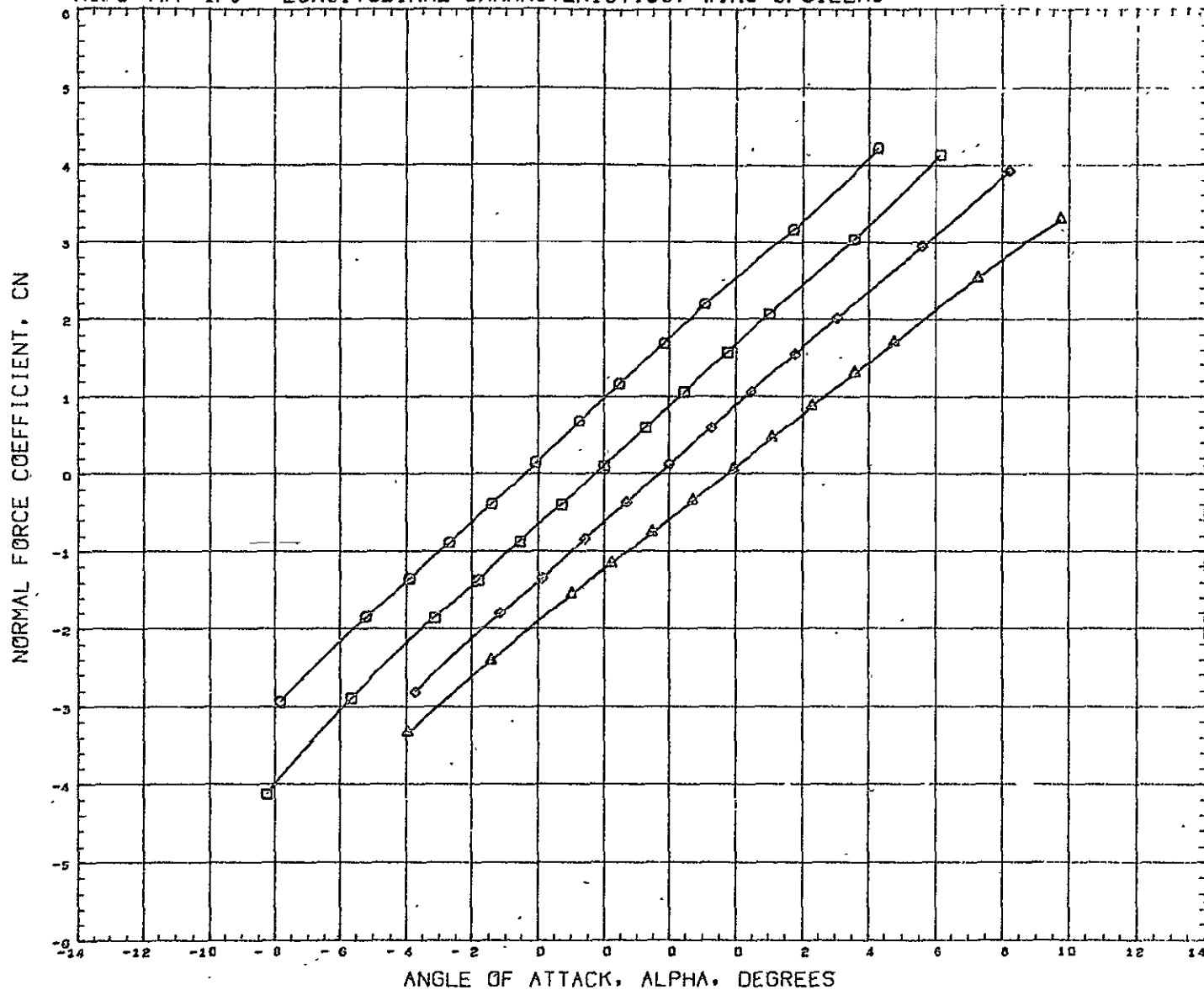


SYMBOL		PARAMETRIC VALUES			
□	0.999	BETA	- 0.050	ORBNIC	- 1.050
◻	0.904	WNGINC	4.000	HTAIL	0.000
◊	0.990	PHIB	0.000		
Δ	1.100				

REFERENCE INFORMATION		
REFS	1.3960	50.1 IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSEC TWT 470 LONGITUDINAL CHARACTERISTICS, WING SPOILERS

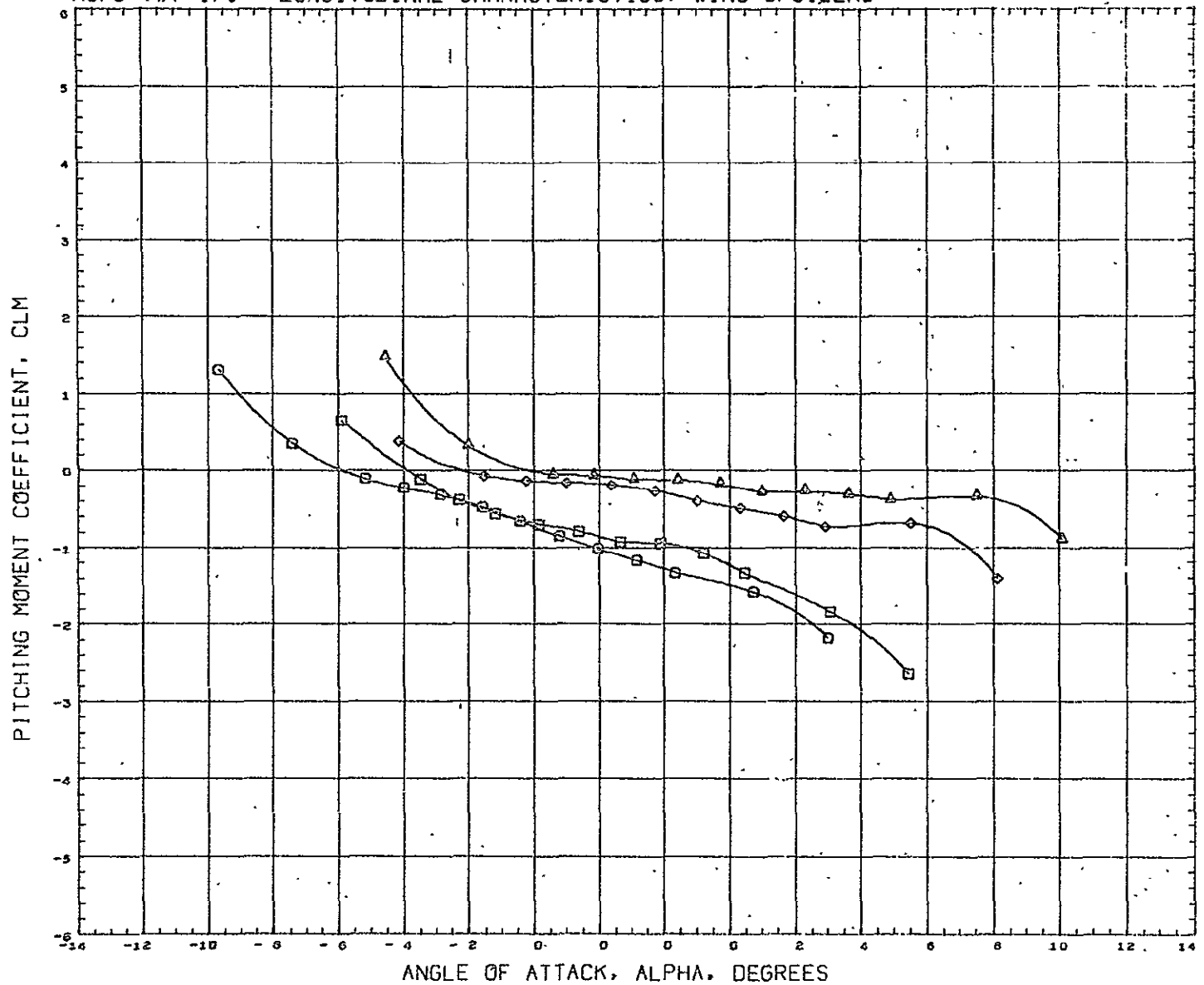


SYMBOL	HACH	PARAMETRIC VALUES			
□	1.200	BETA	- 0.050	ORBINC	- 1.050
◇	1.302	WNGINC	4.000	HTAIL	0.000
○	1.457	PHID	0.000		
△	1.908				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING SPOILERS

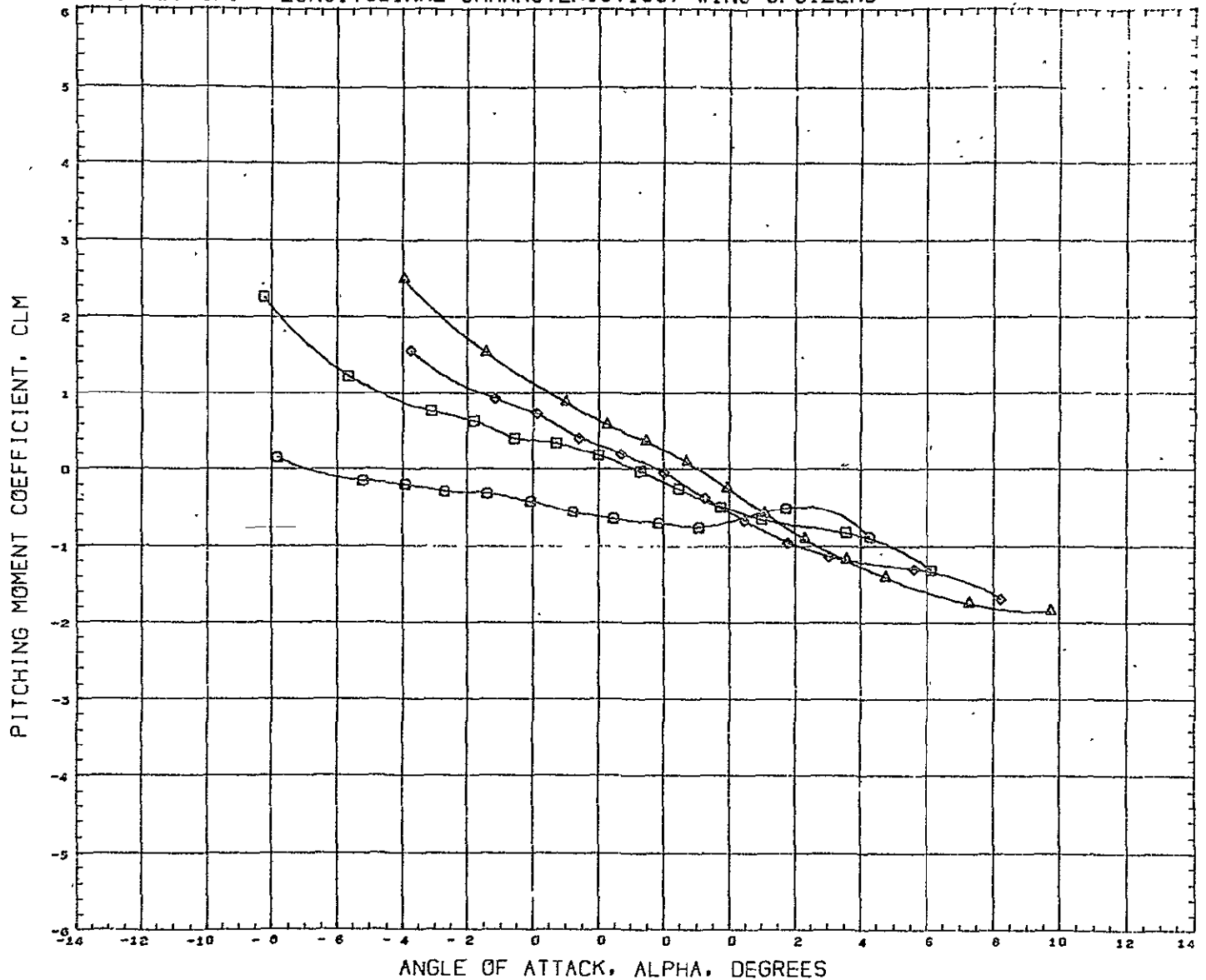


SYMBOL	NACH	PARAMETRIC VALUES			
□	0.599	BETA	- 0.050	ORBINC	- 1.050
◇	0.904	WINGINC	4.000	MTAIL	0.000
○	0.990	PHIB	0.000		
△	1.100				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470. LONGITUDINAL CHARACTERISTICS, WING SPOILERS.

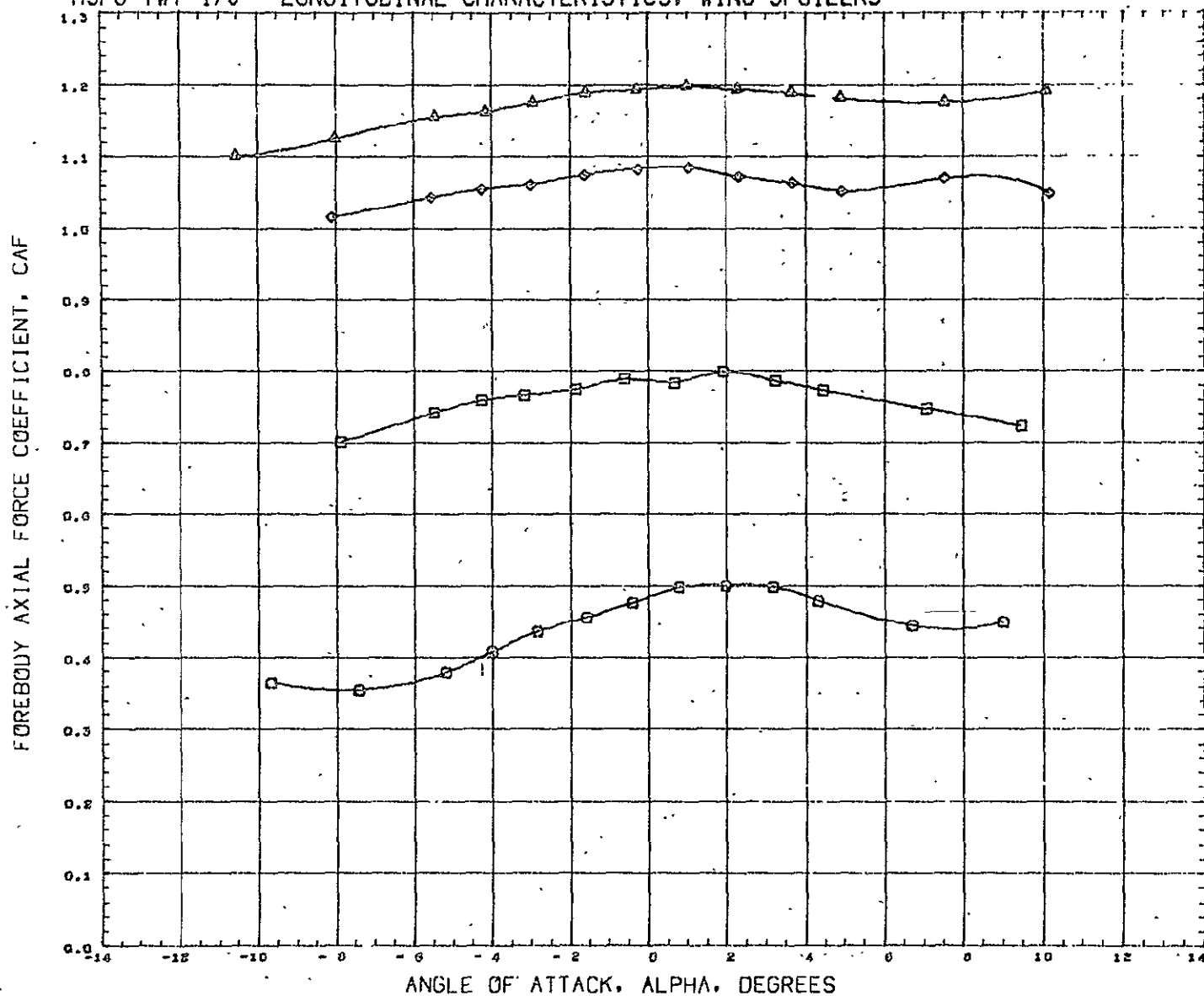


SYMBOL	MACH	PARAMETRIC VALUES			
□	1.200	BETA	- 0.050	ORBINC	- 1.350
◇	1.302	WINGINC	4.000	HTAIL	0.000
○	1.457	PHI0	0.000		
△	1.966				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

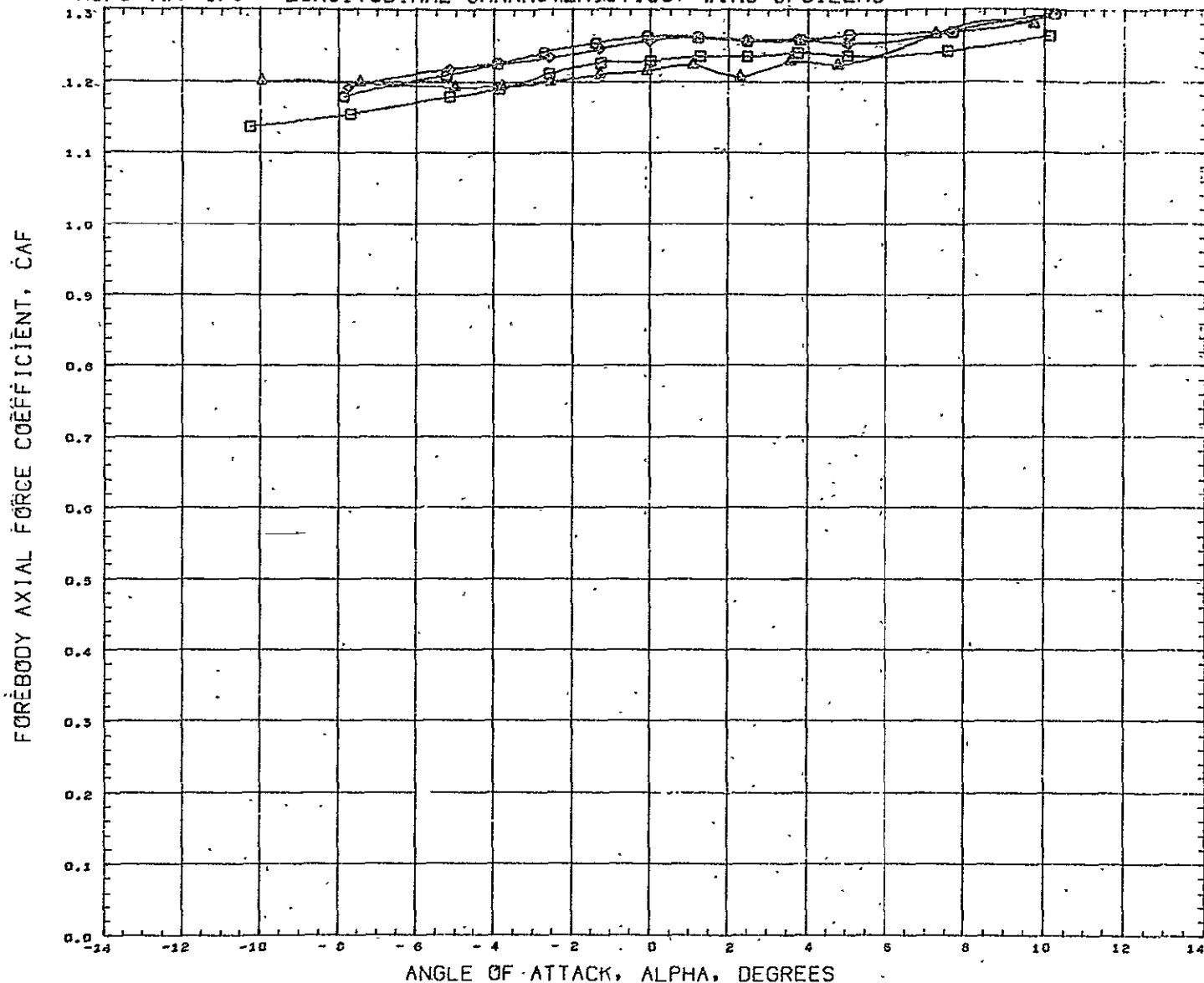
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING SPOILERS



SYMBOL		MACH		PARAMETRIC VALUES		REFERENCE INFORMATION	
○		0.599	DETA	- 0.050	ORBNIC	- 1.050	
□		0.900	WINGINC	4.000	HTAIL	0.000	
◇		0.990	PHIB	0.000			
△		1.100					

REFERENCE FILE

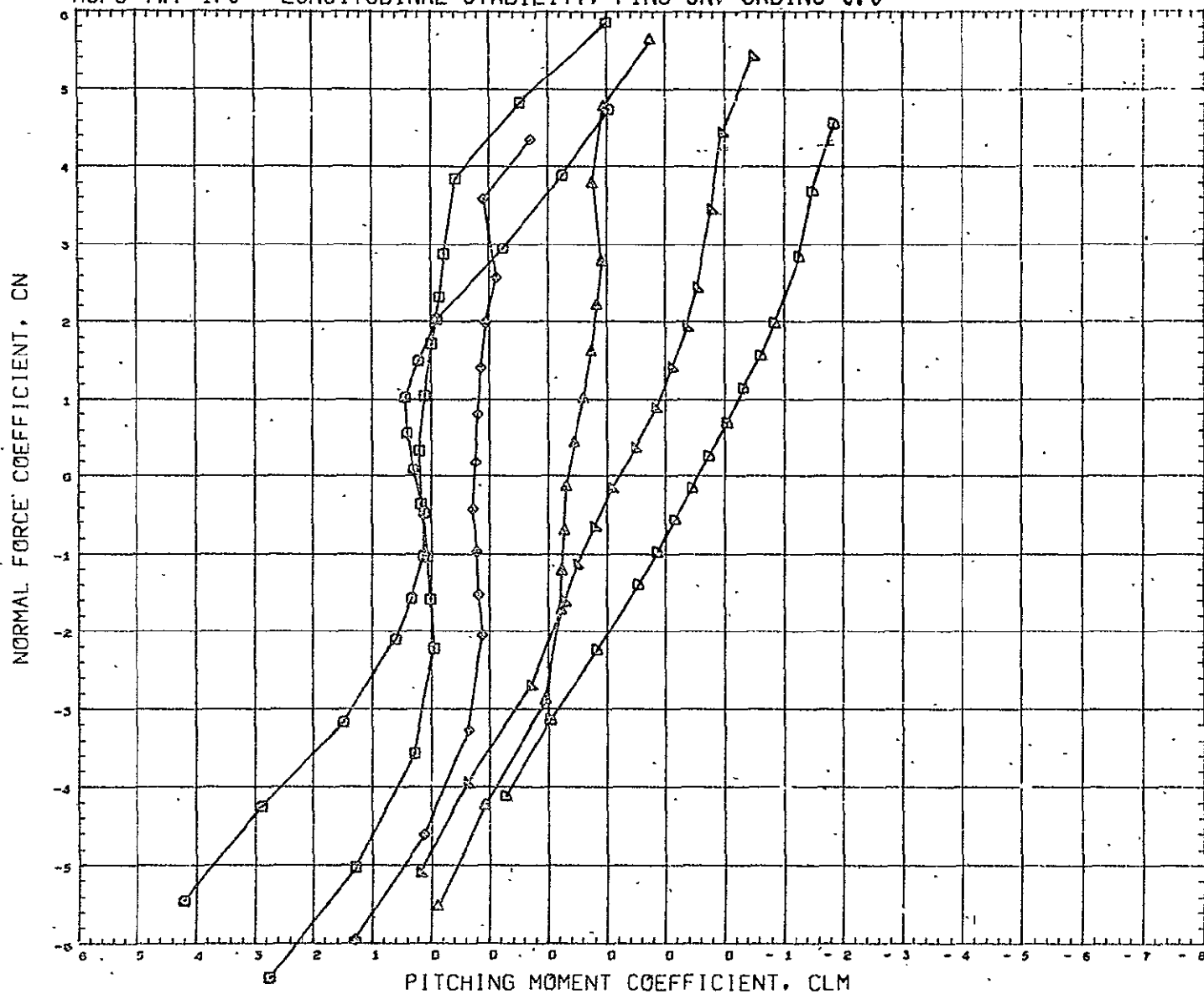
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING SPOILERS



SYMBOL	MACH	PARAMETRIC VALUES				REFERENCE INFORMATION		
○	1.200	BETA	- 0.050	ORBINC	- 1.050	REFS	1.3960	SQ. IN.
□	1.302	WNGINC	4.000	HTAIL	0.000	REFL	1.3330	INCHES
◇	1.457	PHIB	0.000			REFB	1.3330	INCHES
△	1.988					XMRP	5.2640	INCHES
						YMRP	0.0000	INCHES
						ZMRP	0.0000	INCHES
						SCALE	0.3366	PERCENT

REFERENCE FILE

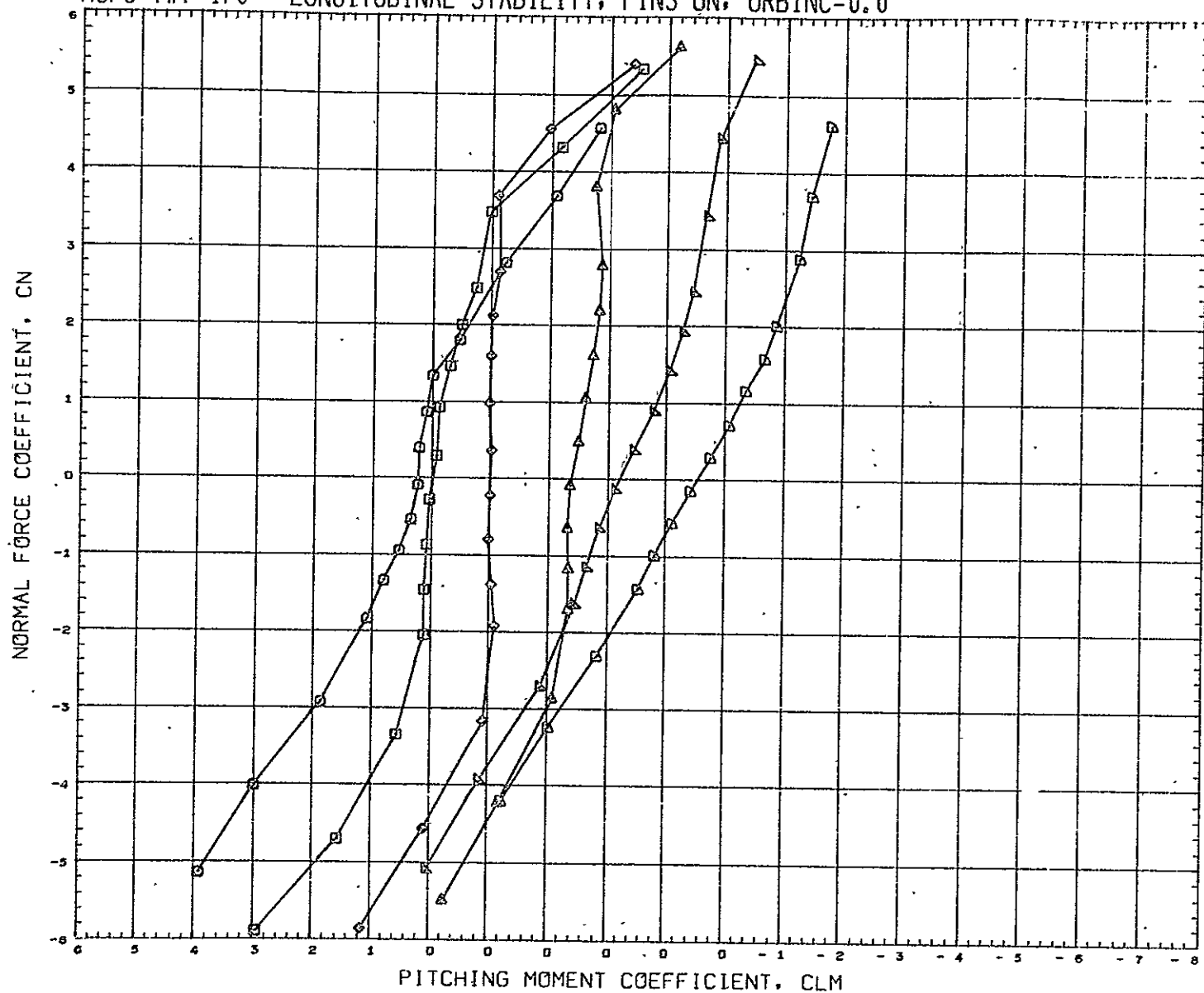
MSFC TWT 470 LONGITUDINAL STABILITY, FINS ON, ORBINC=0.0



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.900	BETA	-0.070	ORBINC	0.000
□	1.002	WNGINC	4.000	HTAIL	0.000
◇	1.103	PHIB	0.000		
△	1.137				
▽	1.461				
◻	1.984	DATA HIST. CODE	5A		

REFERENCE INFORMATION		
REFS	1.3950	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL STABILITY, FINS ON, ORBINC=0.0



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.903	BETA	- 0.090	ORBINC	0.000
□	1.001	WNGINC	4.000	HTAIL	0.000
◇	1.101	PHIB	0.000		
△	1.202				
▲	1.458				
◆	1.905	DATA HIST. CODE	*A		

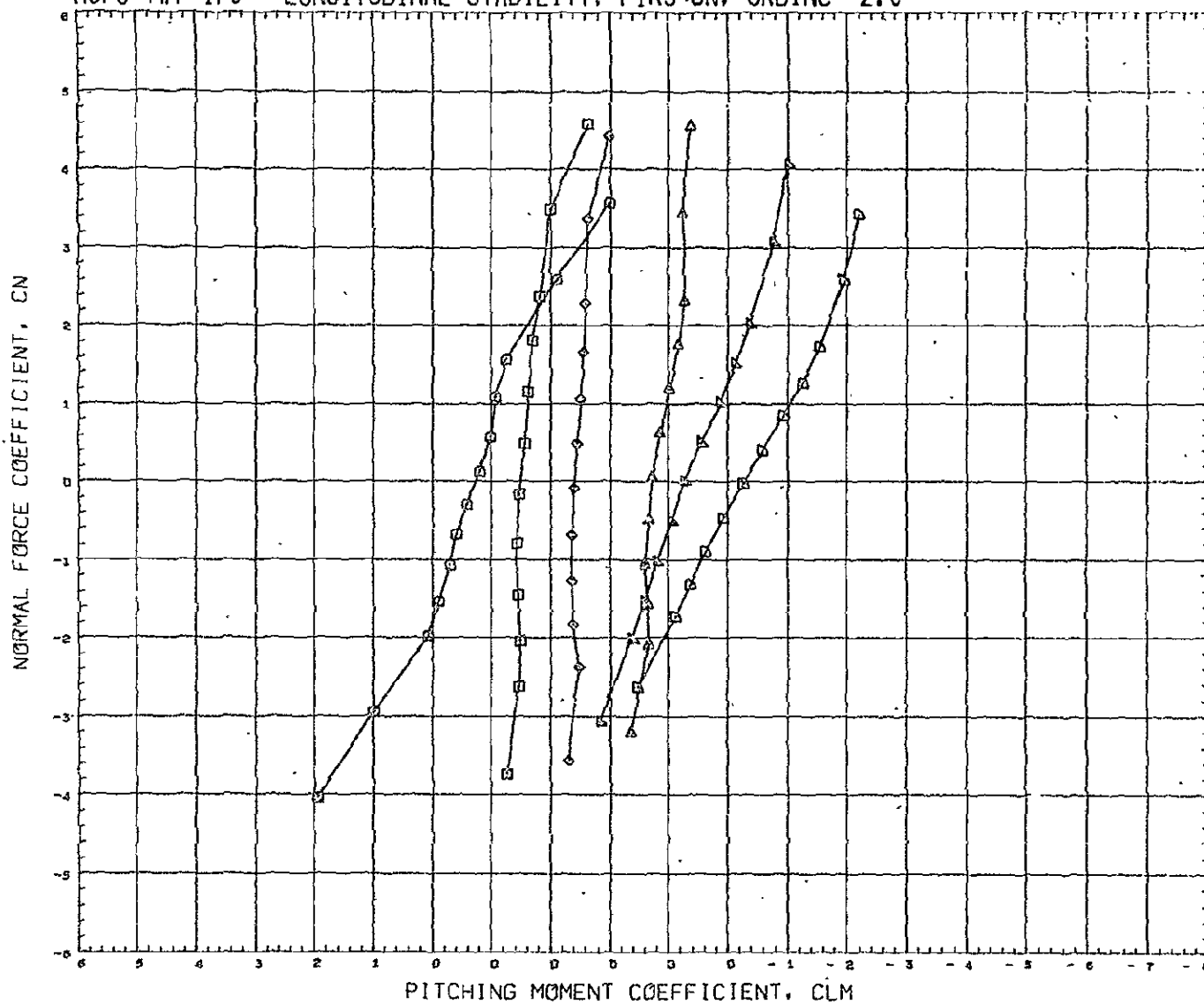
REFERENCE INFORMATION		
REFS	1.3960	SQ.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

TWT470 S-IC/GAC ORBITER BF10WHVS FINS ON

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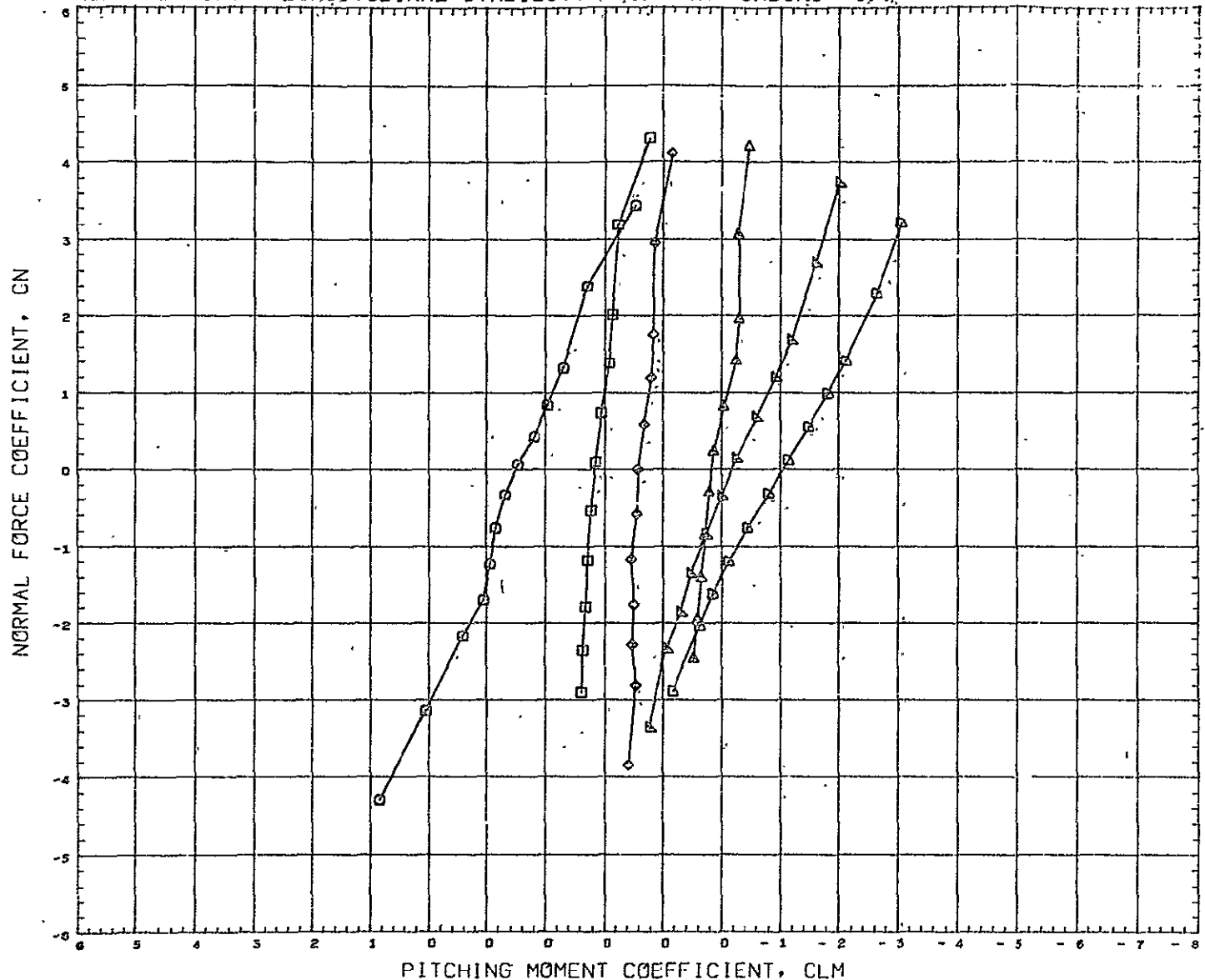
MSFC TWT 470 LONGITUDINAL STABILITY, FINS ON, ORBINC=-2.0



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.999	BETA	- 0.070	ORBINC	- 2.000
□	0.993	WNGINC	4.000	HTAIL	0.000
◇	1.109	PHIB	0.000		
△	1.293				
▽	1.456				
○	1.955	DATA HIST. CODE	*A		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

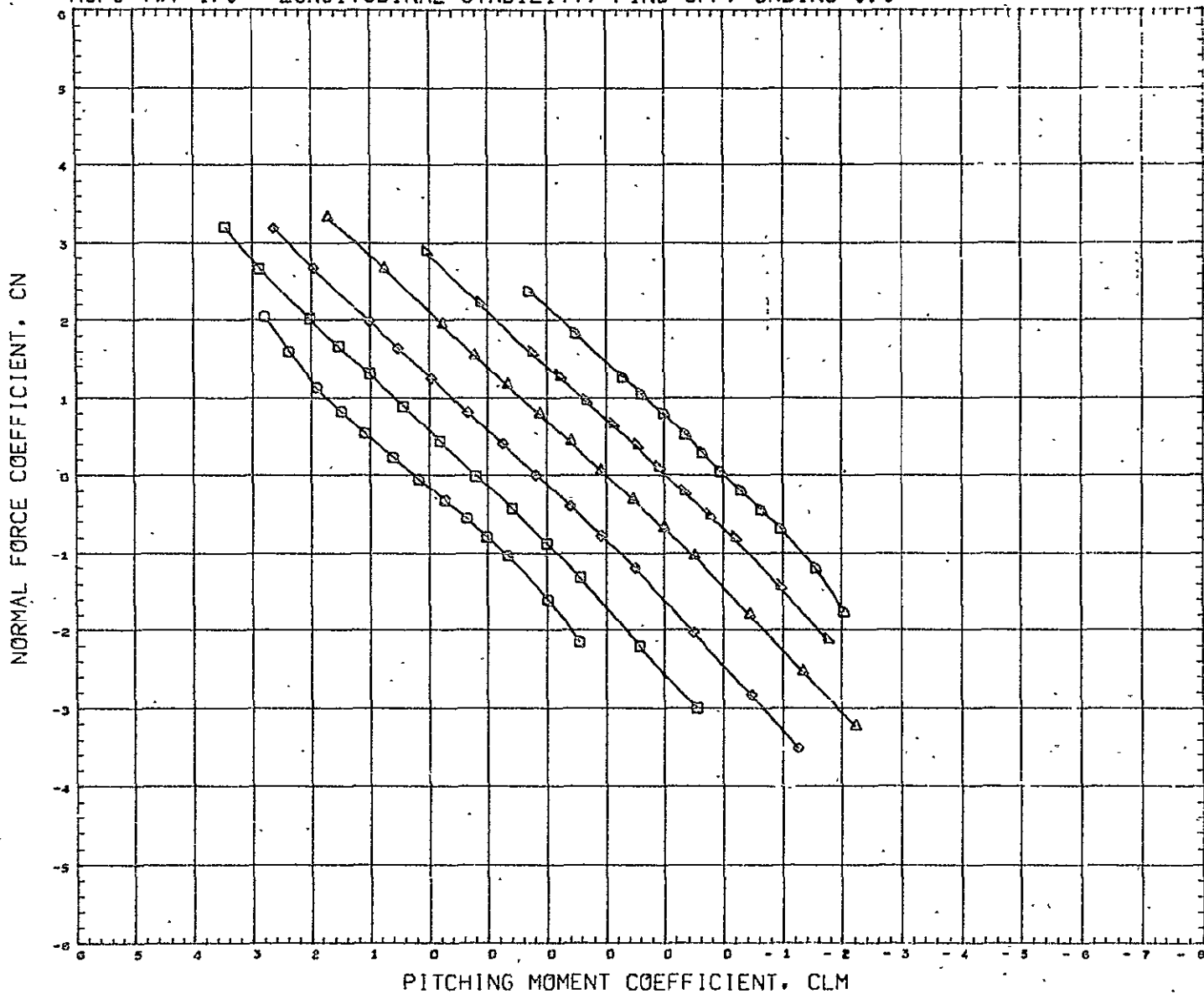
MSFC TWT 470 LONGITUDINAL STABILITY, FINS ON, ORBINC=-4.0



SYMBOL	MACH	PARAMETRIC VALUES			
\square	0.901	BETA	- 0.050	ORBINC	- 4.000
\square	1.000	WINGINC	4.000	NTAIL	0.000
\diamond	1.090	PHIB	0.000		
\triangle	1.193				
∇	1.458				
\square	1.950	DATA HIST. CODE	*A		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRF	5.2640	INCHES
YNRF	0.0000	INCHES
ZNRF	0.0000	INCHES
SCALE	0.3366	PERCENT

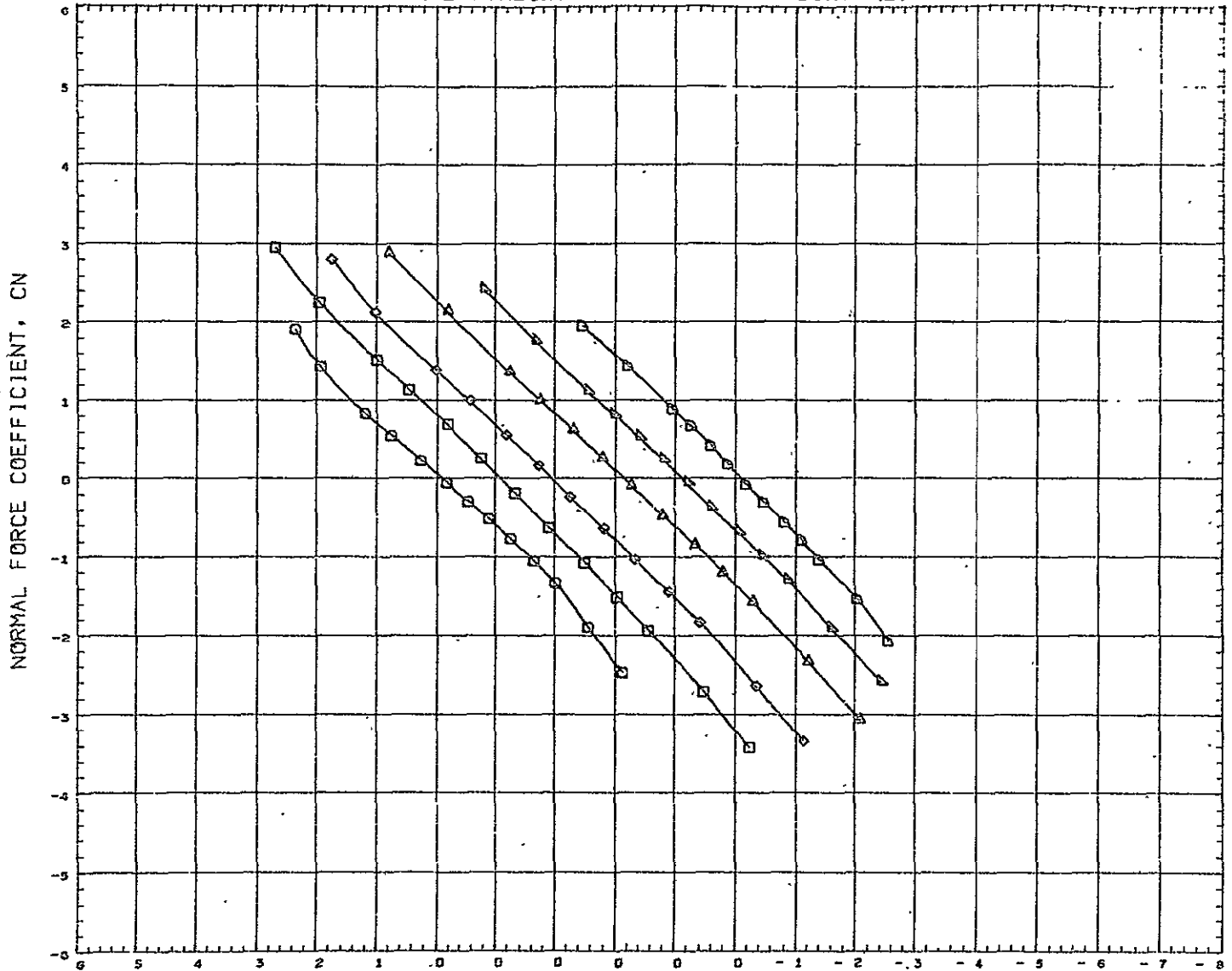
MSFC TWT 470 LONGITUDINAL STABILITY, FINS OFF, ORBINC=0.0



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.899	BETA	-0.050	ORBINC	0.000
□	0.993	WNGINC	4.000	HTAIL	0.000
◇	1.101	PHIB	0.000		
△	1.201				
▽	1.457				
D	1.951	DATA HIST. CODE	#A		

REFERENCE INFORMATION		
REFS	1.3960	SQ.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL STABILITY, FINS OFF; ORBINC=-2.0



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.905	BETA	- 0.080	ORBINC	- 2.000
□	0.994	WINGINC	4.000	HTAIL	0.000
◇	1.100	PHIB	0.000		
△	1.203				
▽	1.434				
◻	1.980	DATA HIST. CODE	*A		

REFERENCE INFORMATION		
REFS	1.3960	90. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

TWT470 S-IC/GAC ORBITER BOWHVS

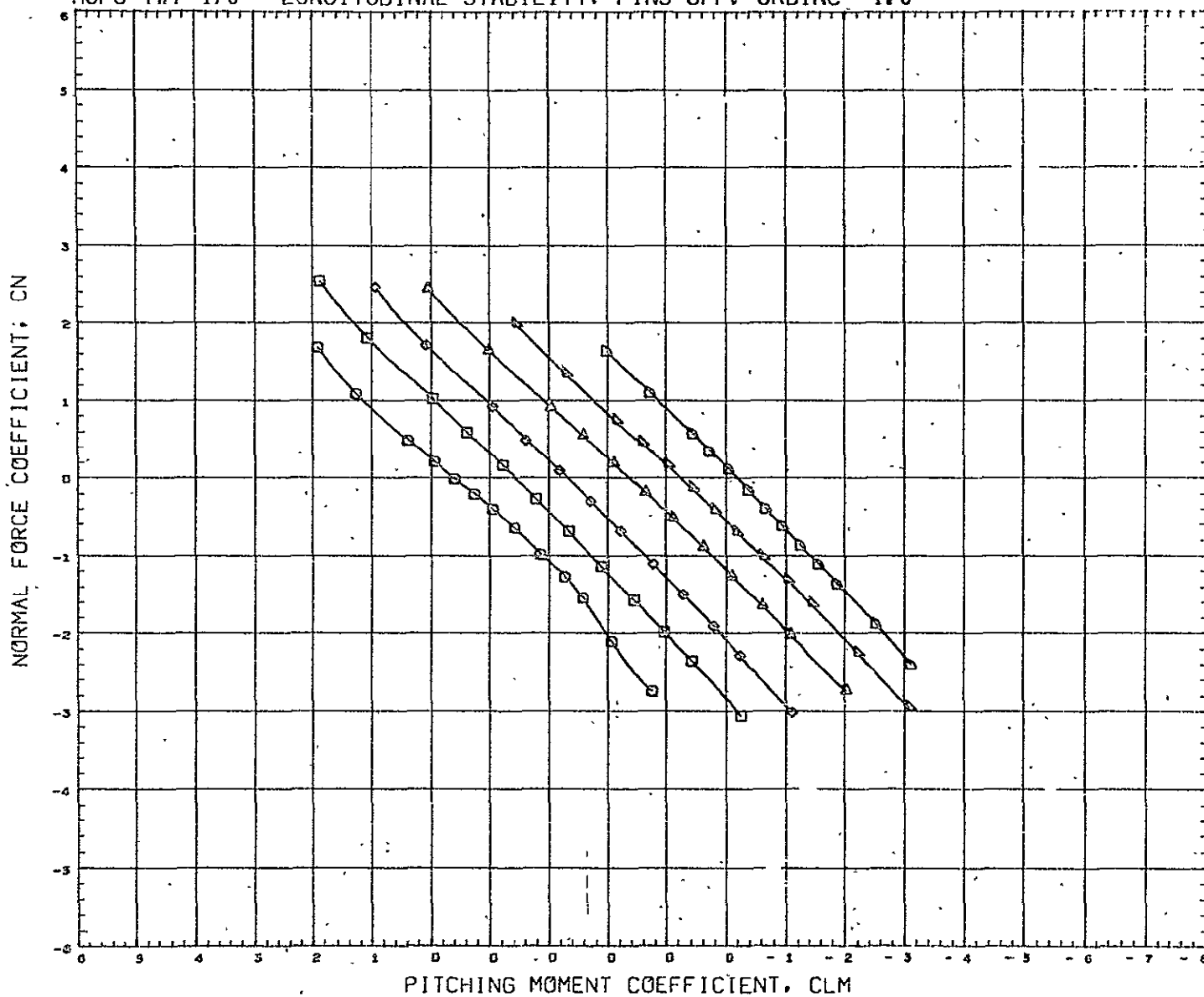
FINS OFF

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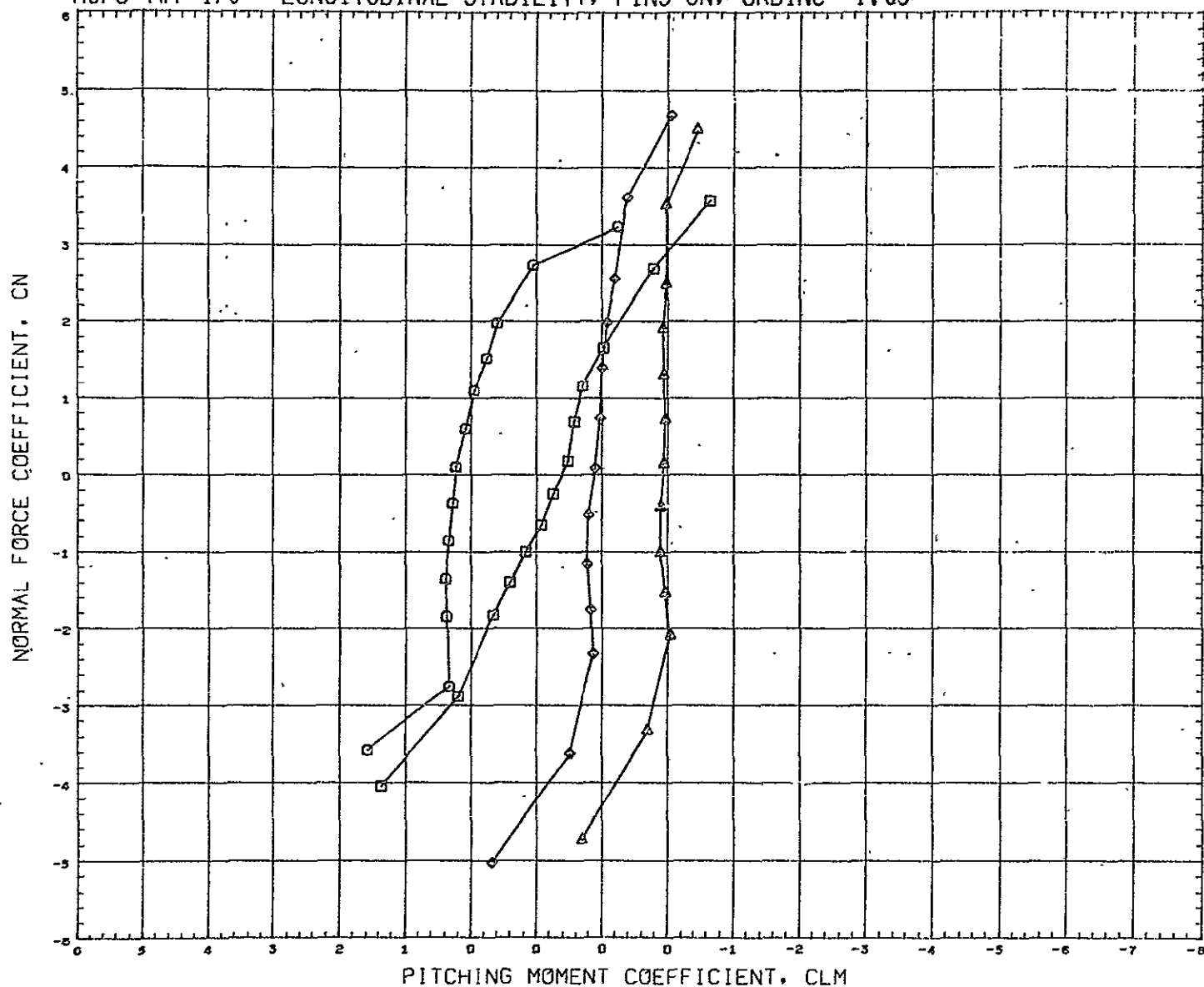
MSFC TWT 470 LONGITUDINAL STABILITY, FINS OFF, ORBINC=-4.0



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.900	BETA	- 0.040	ORBINC	- 4.000
□	0.997	WINGINC	4.000	HTAIL	0.000
◇	1.100	PHIB	0.000		
△	1.199				
▽	1.400				
D	1.952	DATA HIST. CODE	*A		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFD	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL STABILITY, FINS ON, ORBINC=-1.05

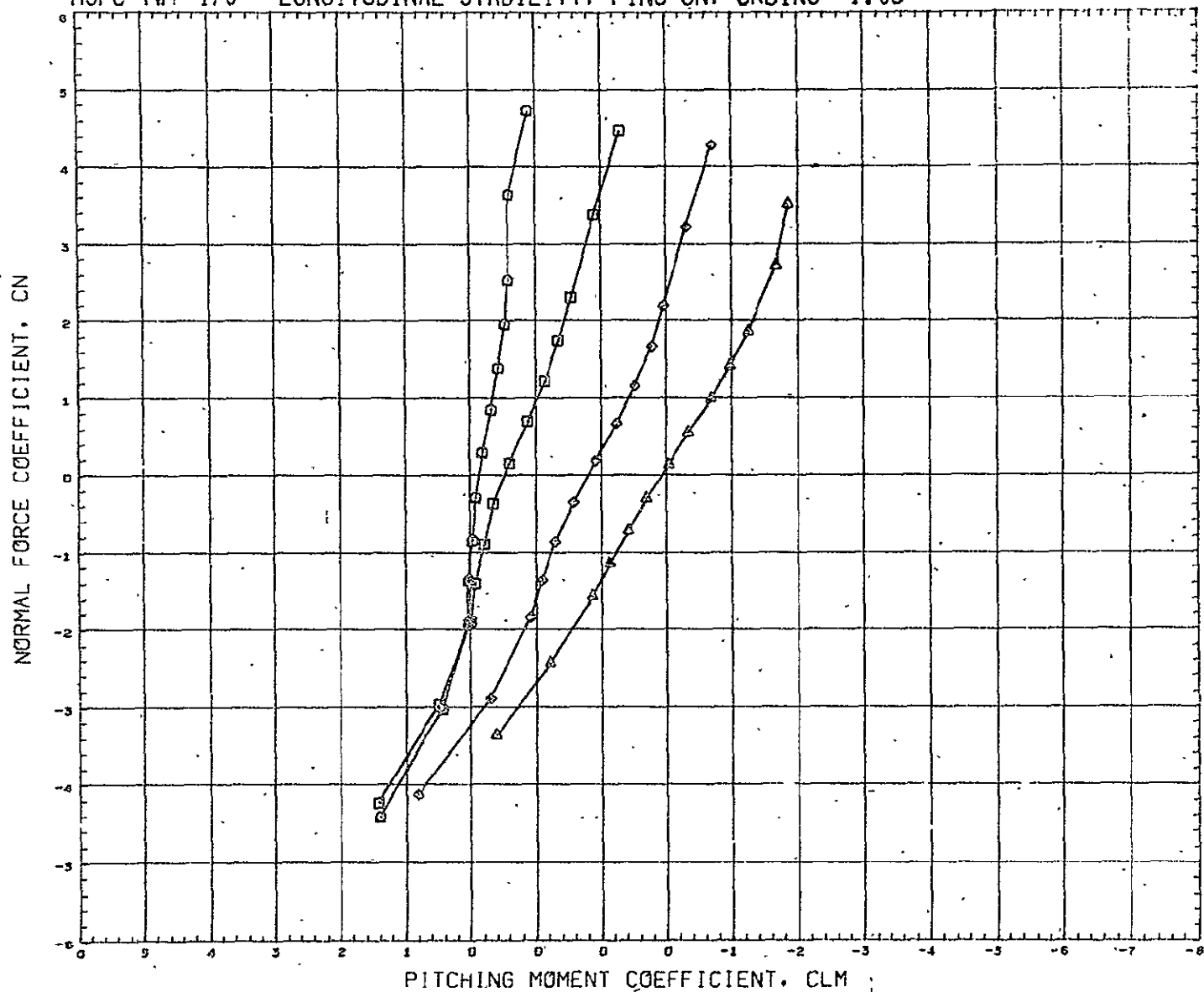


SYMBOL	MACH	PARAMETRIC VALUES			
□	0.599	BETA	- 0.050	ORBINC	- 1.050
◇	0.899	WINGINC	4.000	HTAIL	0.000
○	0.997	PHIB	0.000		
△	1.095				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 · LONGITUDINAL STABILITY, FINS ON, ORBINC=-1.05

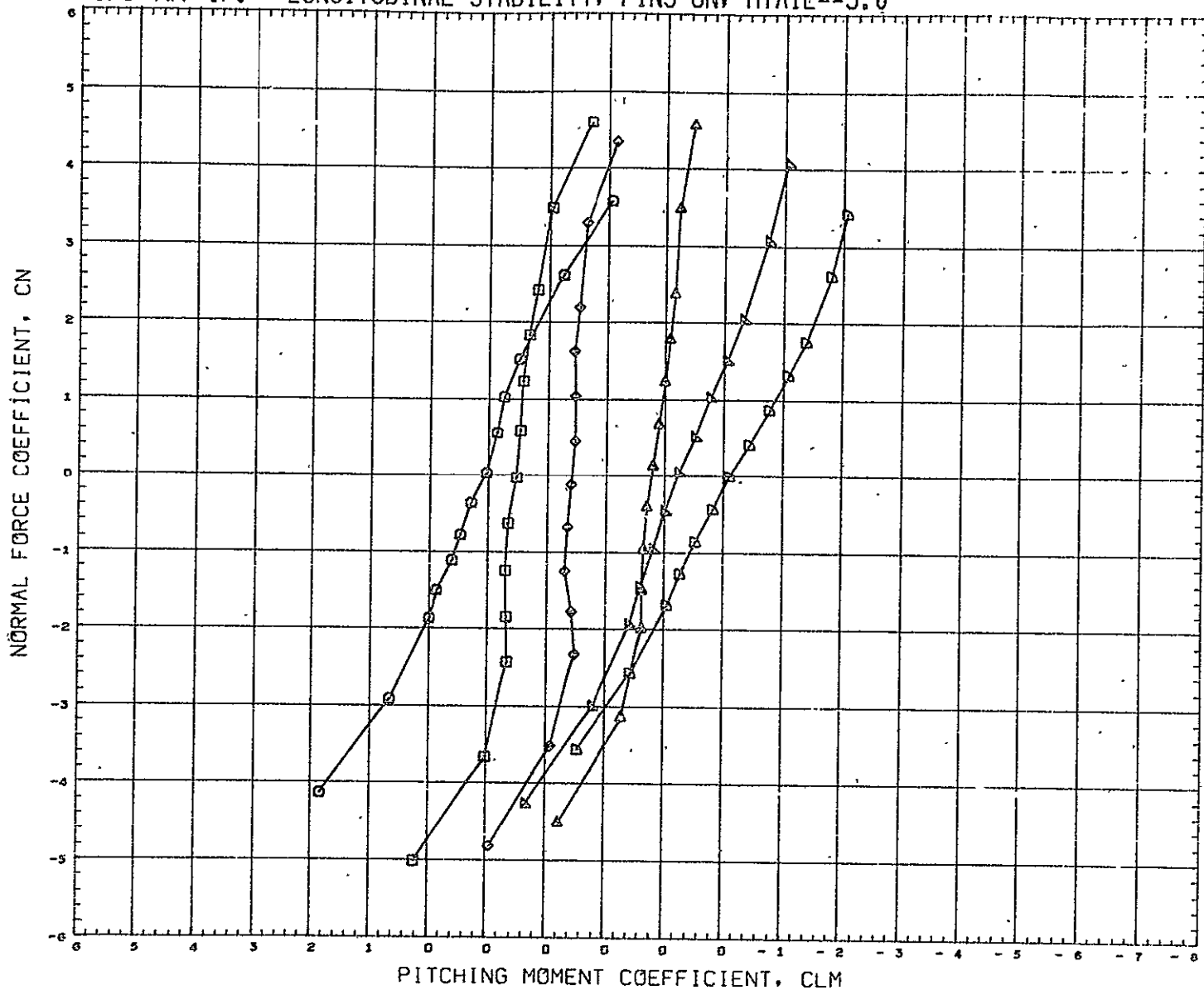


SYMBOL	NACH	PARAMETRIC VALUES			
○	1.195	BETA	- 0.050	ORBINC	- 1.050
□	1.303	WINGINC	4.000	HTAIL	0.000
◇	1.436	PHIB	0.000		
△	1.967				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL STABILITY, FINS ON, HTAIL=-5.0



SYMBOL	MACH	PARAMETRIC VALUES			
□	0.893	BETA	- 0.020	ORBINC	- 1.050
□	0.995	WINGINC	4.000	HTAIL	- 5.000
◇	1.093	PHIB	0.000		
△	1.199				
△	1.454				
△	1.961	DATA HIST. CODE	#A		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

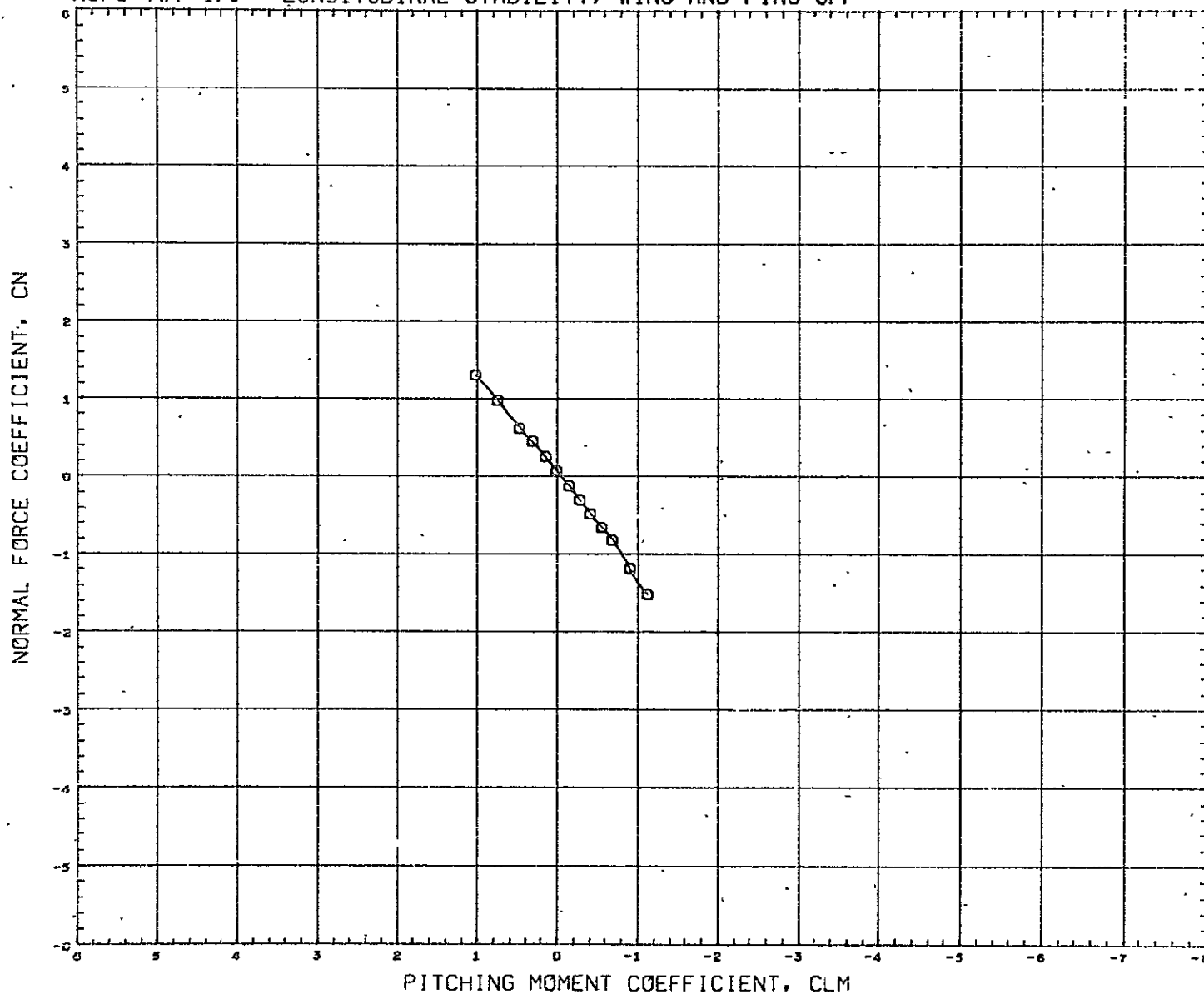
TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 LONGITUDINAL STABILITY, WING AND FINS OFF

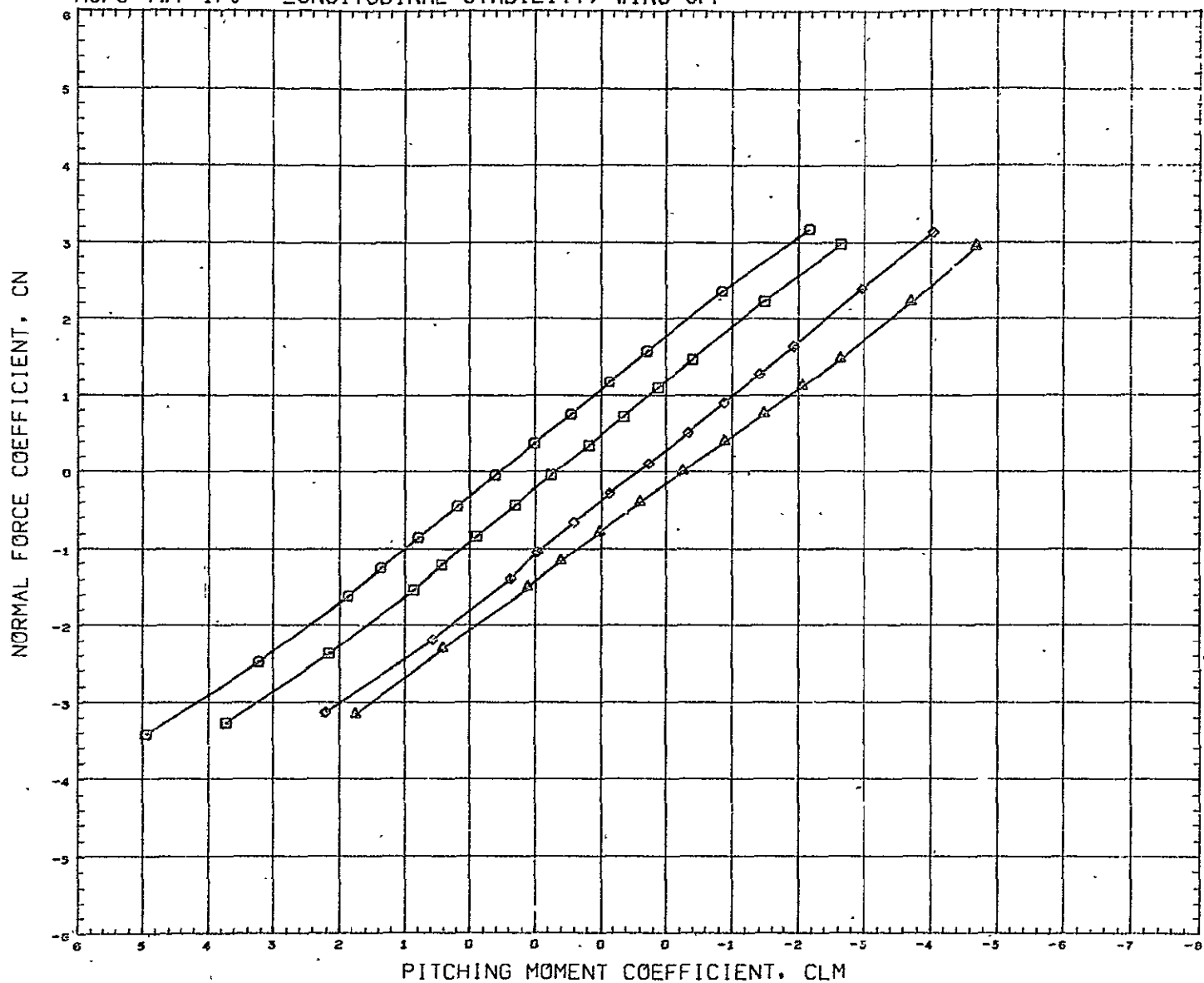


SYMBOL	HACH	PARAMETRIC VALUES			
0	0.995	BETA	- 0.100	ORBINC	- 1.050
		HTAIL	0.000	FHIB	0.000

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 LONGITUDINAL STABILITY, WING OFF



SYMBOL	MACH	PARAMETRIC VALUES			
\circ	0.999	BETA	- 0.100	ORBINC	- 1.050
\square	1.102	HTAIL	0.000	PHIB	0.000
\diamond	1.195				
\triangle	1.459				

REFERENCE FILE

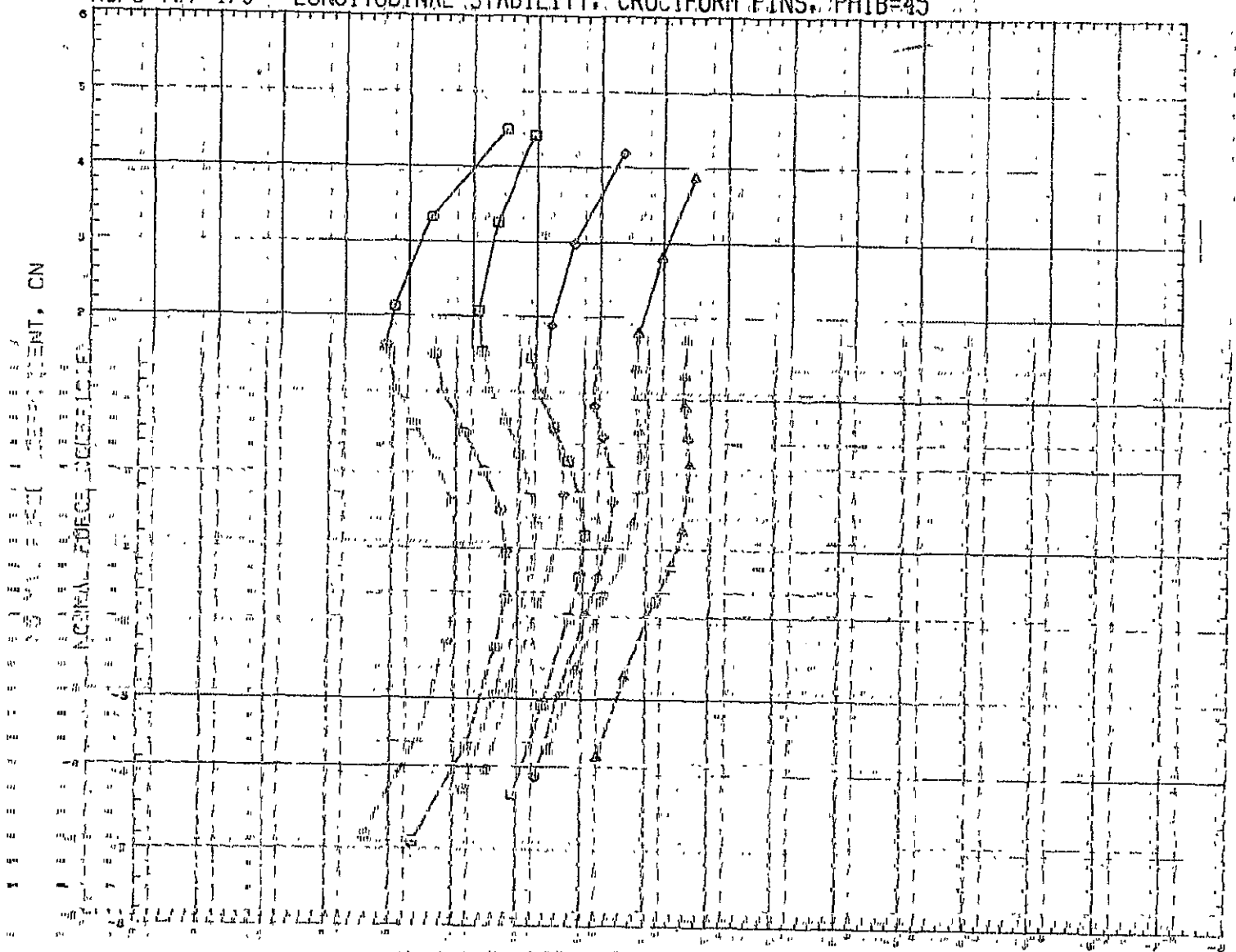
REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

TWT470 S-IC/CAC ORBITER BF10HVS WING OFF

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MSFC TWT 470 LONGITUDINAL STABILITY, CRUCIFORM FINS, PHIB=45



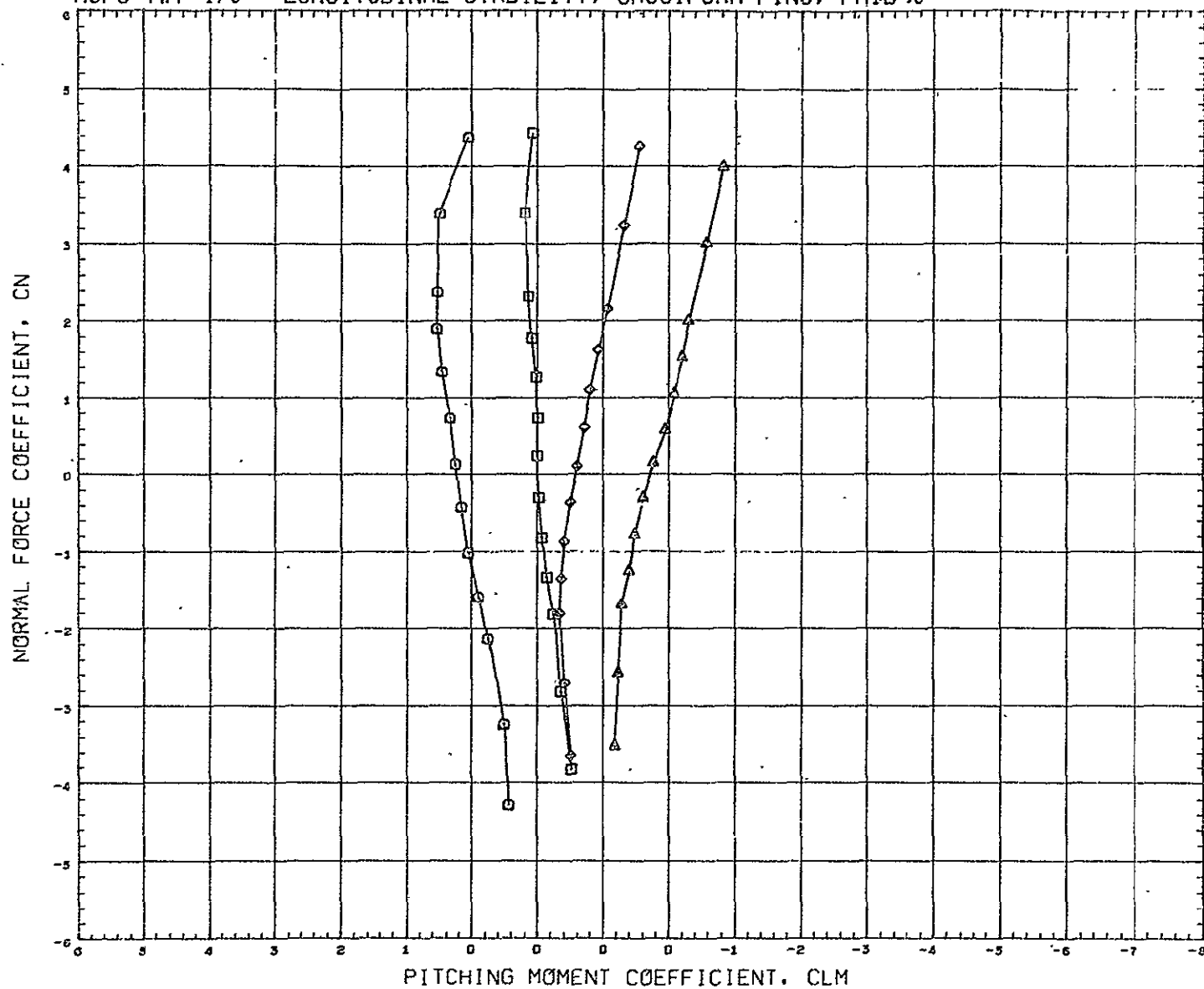
PITCHING MOMENT COEFFICIENT, $C_{m\alpha}$

1.0000 IN. DIA. 0.0000 IN. DIA. 0.0000 IN. DIA. 0.0000 IN. DIA.
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REFERENCE FILE

REFERENCE INFORMATION
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 PERIM 3.1416 INCHES
 XMRP 0.0000 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.0000 PERCENT

MSFC TWT 470 LONGITUDINAL STABILITY, CRUCIFORM FINS, PHIB=0



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.997	BETA	- 0.060	ORBINC	- 1.050
□	1.198	WHGINC	4.000	HTAIL	0.000
◇	1.303	PHIB	0.000		
△	1.459				

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

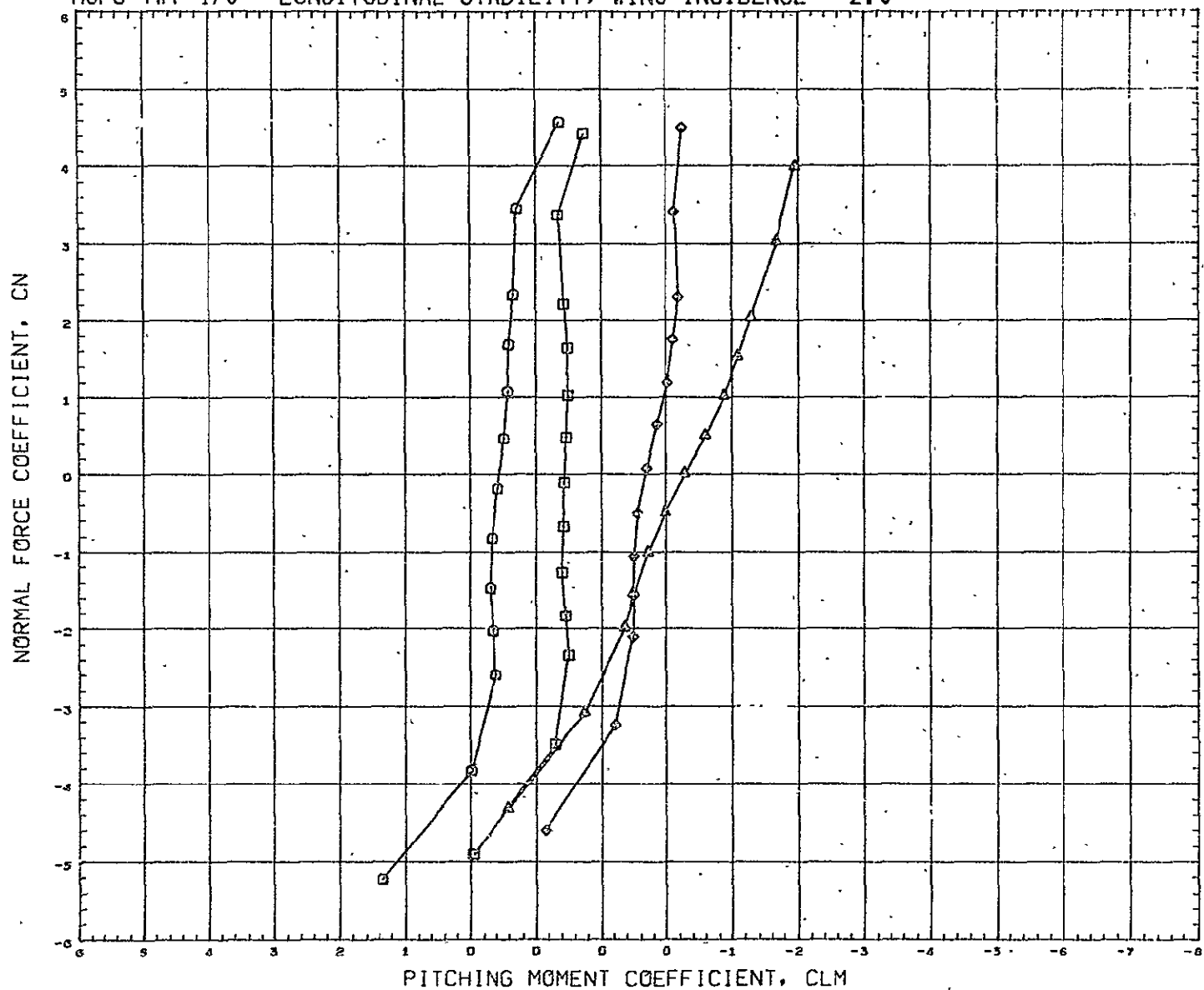
TWT470 S-IC/GAC ORBITER 'BF20WHVS PHIB = 0

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MSFC TWT-470 LONGITUDINAL STABILITY, WING INCIDENCE = 2.0

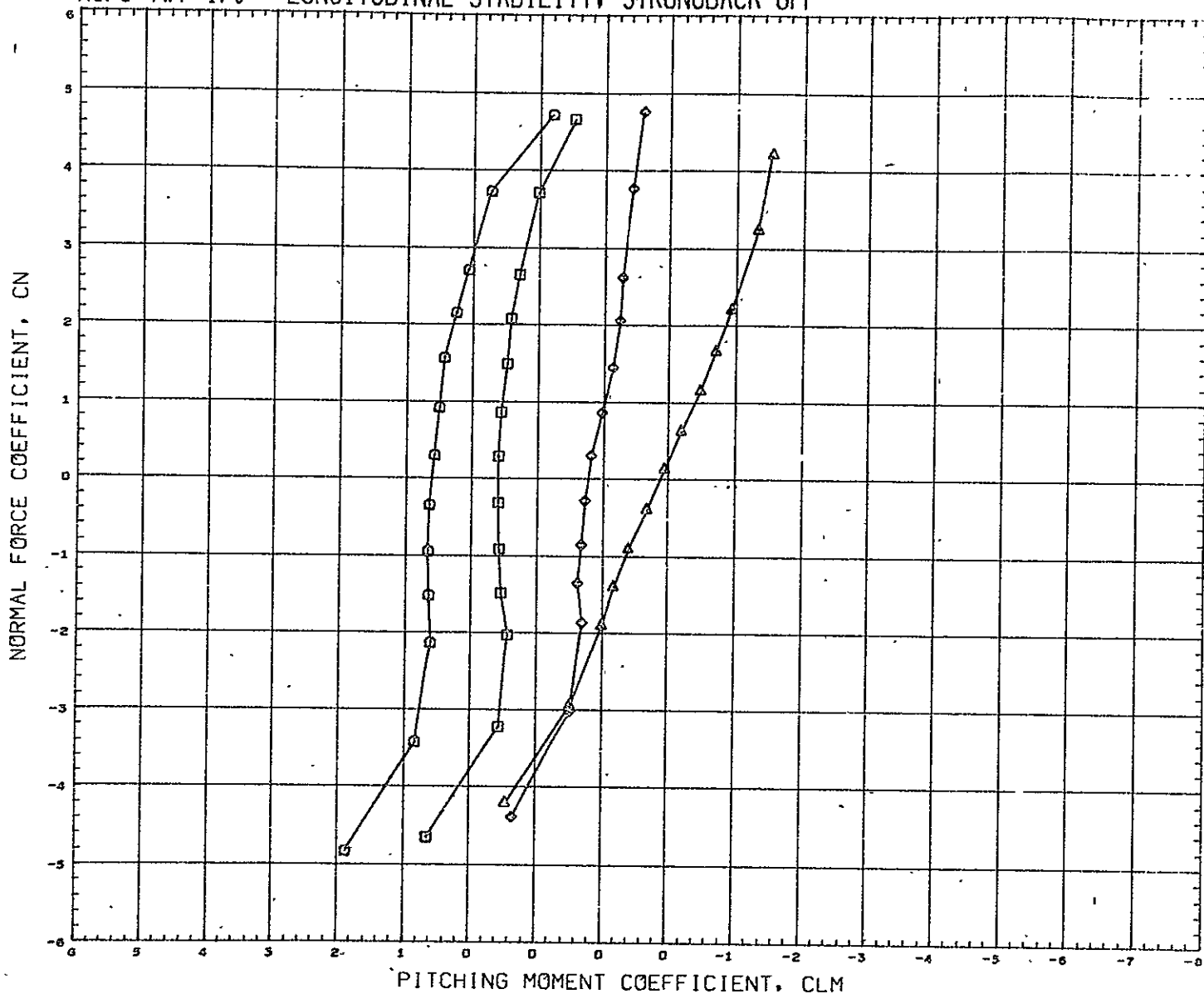


SYMBOL		PARAMETRIC VALUES			
○	1.001	BETA	- 0.090	ORBINC	- 1.050
□	1.091	WNGINC	2.000	HTAIL	- 0.000
◇	1.202	PHIB	0.000		
△	1.455				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL STABILITY, STRONGBACK OFF

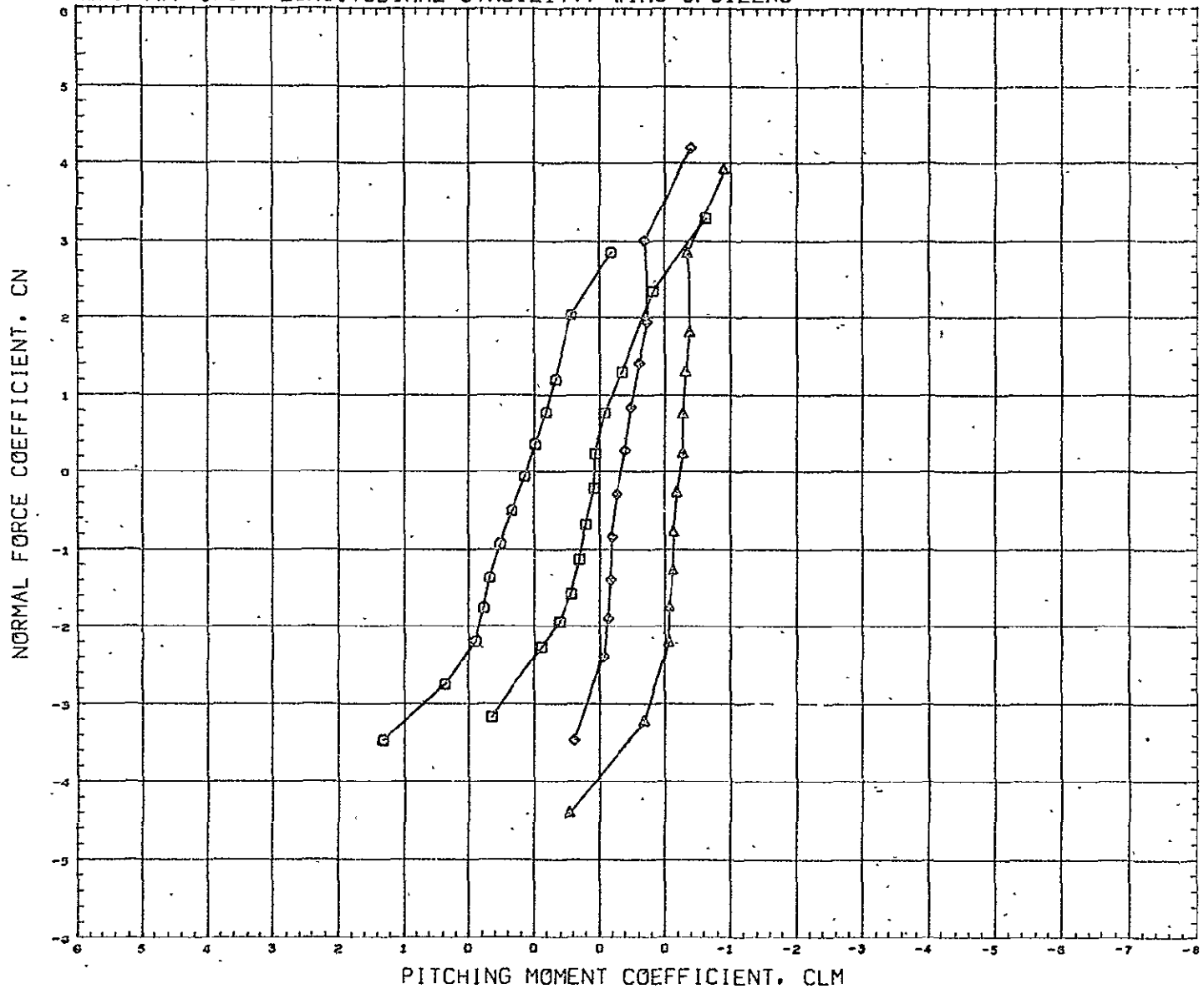


SYMBOL	MACH	PARAMETRIC VALUES			
○	1.002	BETA	- 0.040	ORBINC	- 1.050
□	1.099	WNGINC	4.000	HTAIL	0.000
◇	1.200	PHIB	0.000		
△	1.460				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SO. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL STABILITY, WING SPOILERS



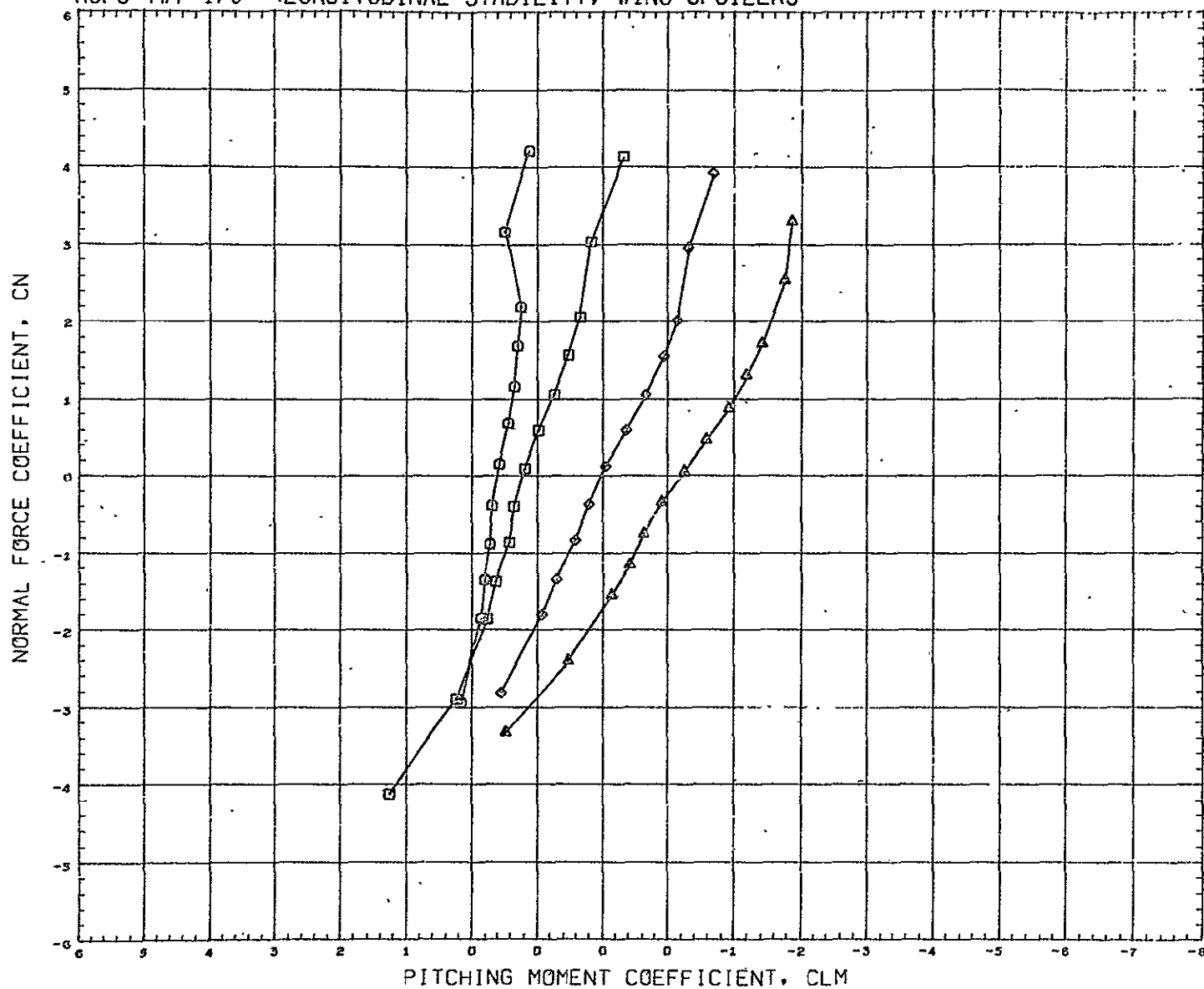
PITCHING MOMENT COEFFICIENT, CLM

SYMBOL	MACH	PARAMETRIC VALUES			
\circ	0.599	BETA	- 0.050	ORBNIC	- 1.050
\square	0.904	WNGINC	4.000	NTAIL	0.000
\diamond	0.998	PHIB	0.000		
\triangle	1.100				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL STABILITY, WING SPOILERS

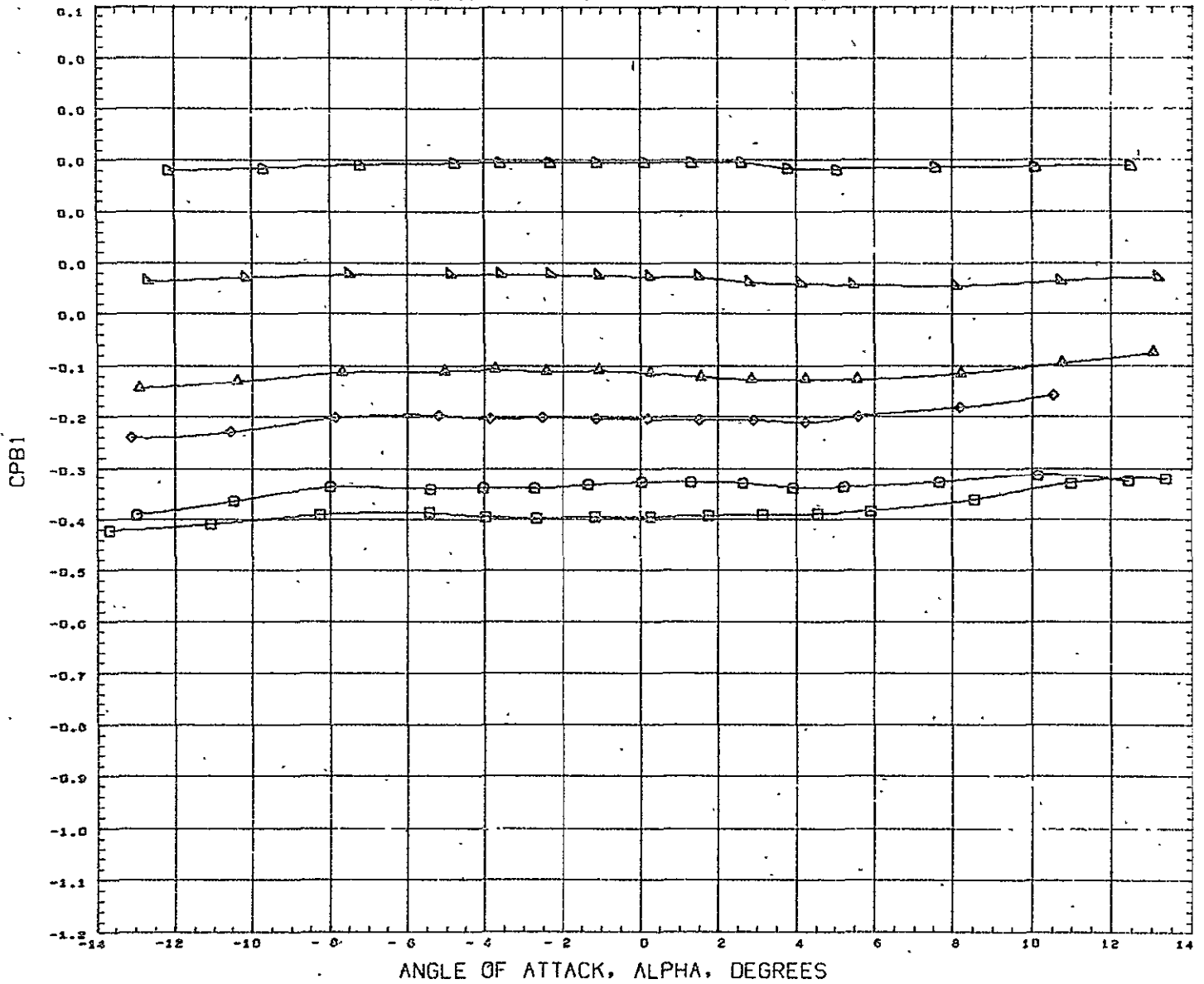


SYMBOL	MACH	PARAMETRIC VALUES			
○	1.200	BETA	- 0.050	ORBINC	- 1.050
□	1.302	WINGINC	4.000	MTAIL	0.000
◇	1.457	FHIB	0.000		
△	1.959				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

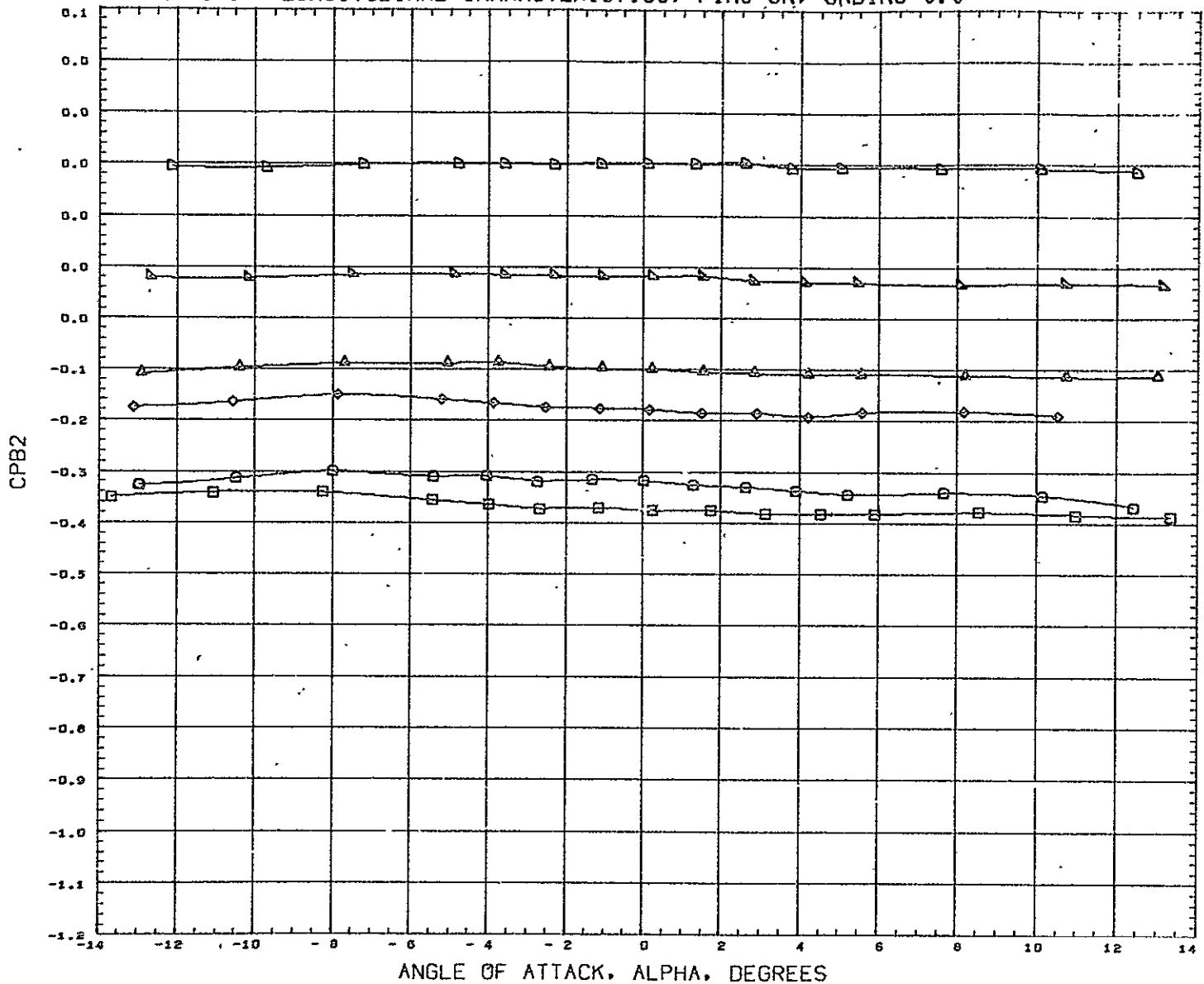
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=0.0



SYMBOL	MACH	PARAMETRIC VALUES			
□	0.900	BETA	0.070	ORBINC	0.000
□	1.002	WINGINC	4.000	HTAIL	0.000
○	1.103	PHIB	0.000		
△	1.197				
▽	1.461				
◇	1.964	DATA HIST. CODE	*A		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

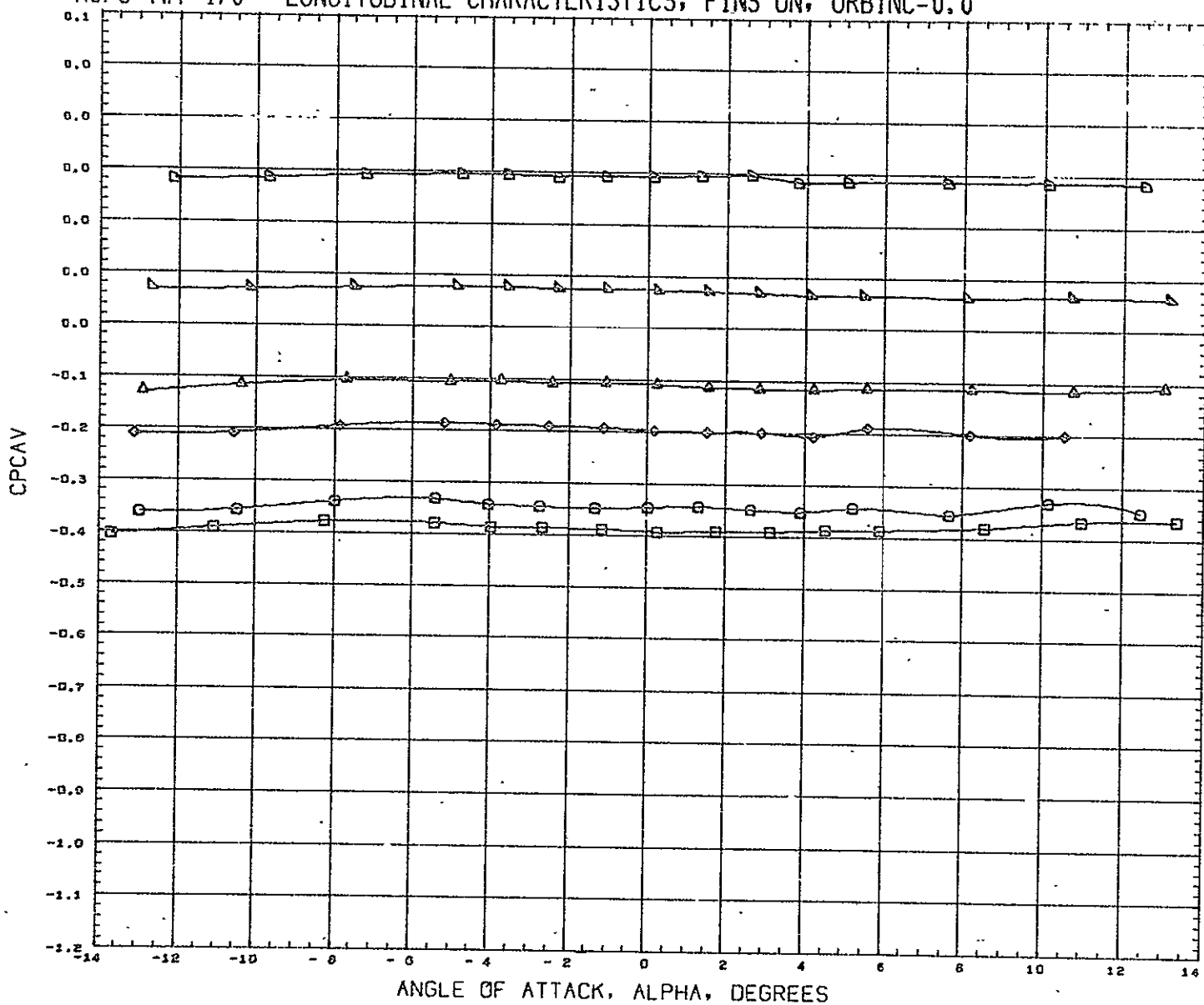
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=0.0



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.900	BETA	- 0.070	ORBINC	0.000
□	1.002	WNGINC	4.000	HTAIL	0.000
◇	1.103	PHIB	0.000		
△	1.197				
▽	1.461				
◻	1.964	DATA HIST. CODE	*A		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

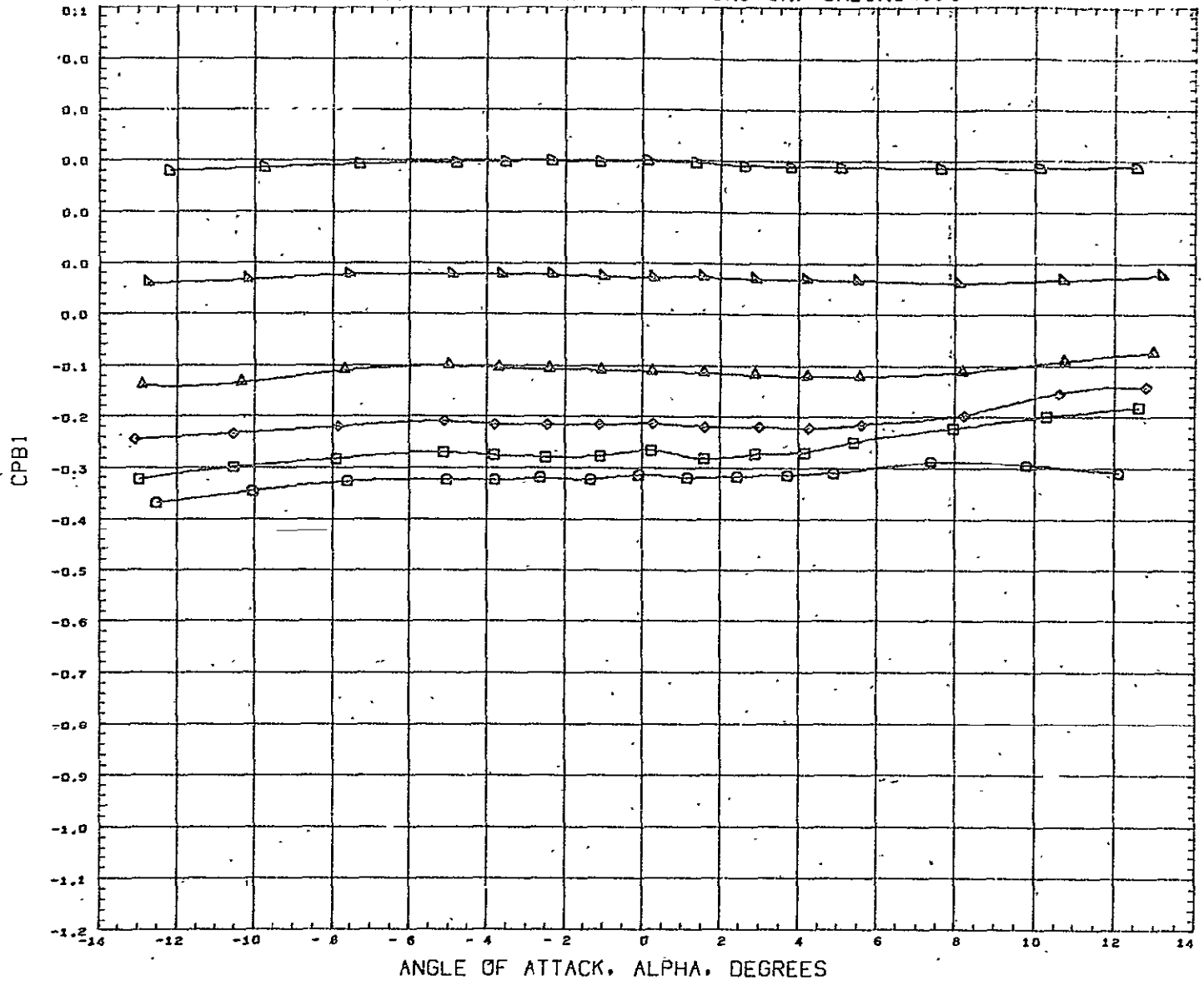
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=0.0



SYMBOL	NACH	PARAMETRIC VALUES
□	0.900	BETA - 0.070 ORBINC 0.000
□	1.002	WINGINC 4.000 HTAIL 0.000
◇	1.103	PHIB 0.000
△	1.197	
△	1.401	
△	1.964	DATA HIST. CODE #A

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

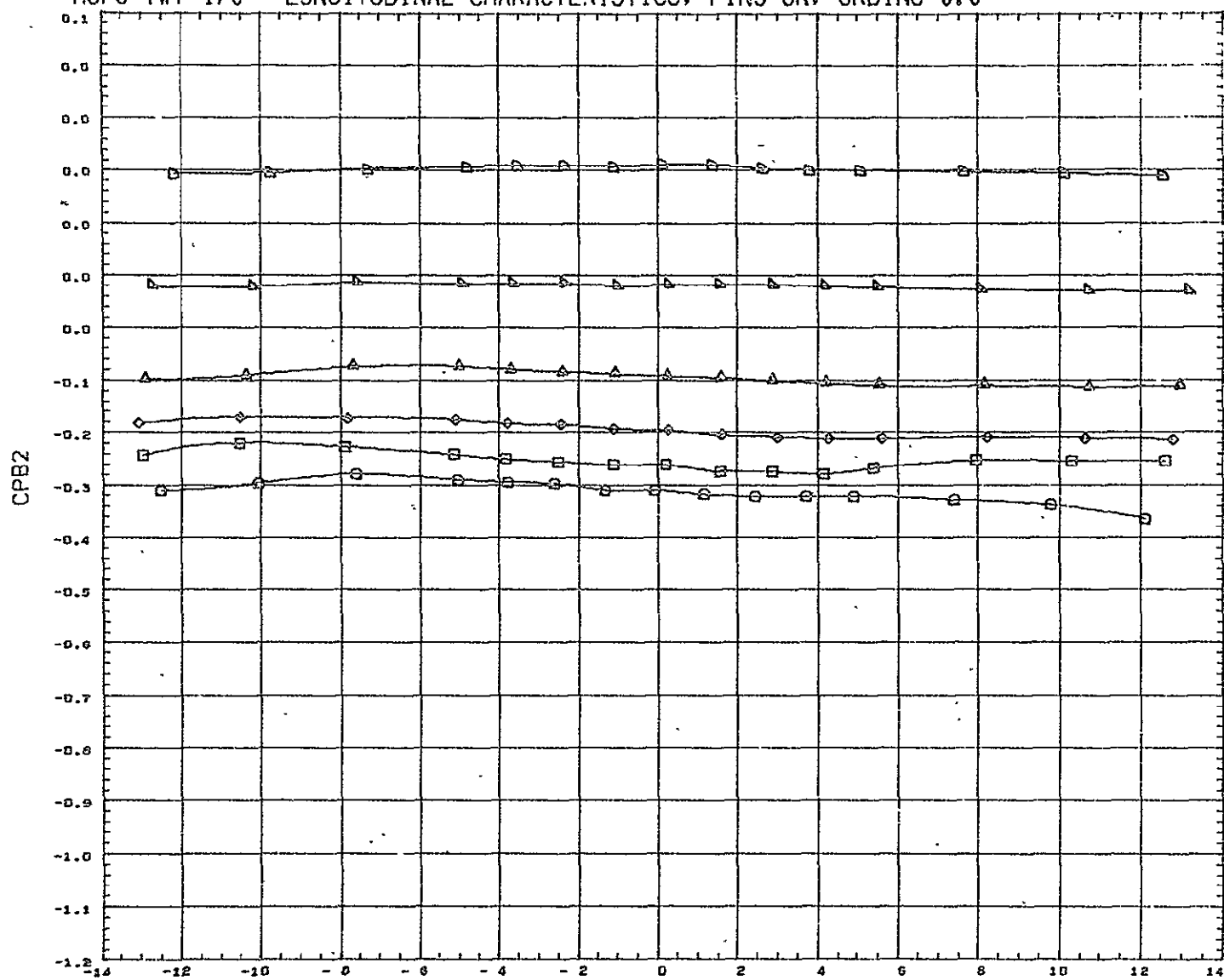
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=0.0



MBOL	MACH	PARAMETRIC VALUES			
Q	0.903	BETA	-0.090	ORBINC	0.000
Q	1.001	WINGINC	4.000	HTAIL	0.000
Q	1.101	PHIB	0.000		
A	1.202				
A	1.450				
A	1.965	DATA HIST. CODE	#A		

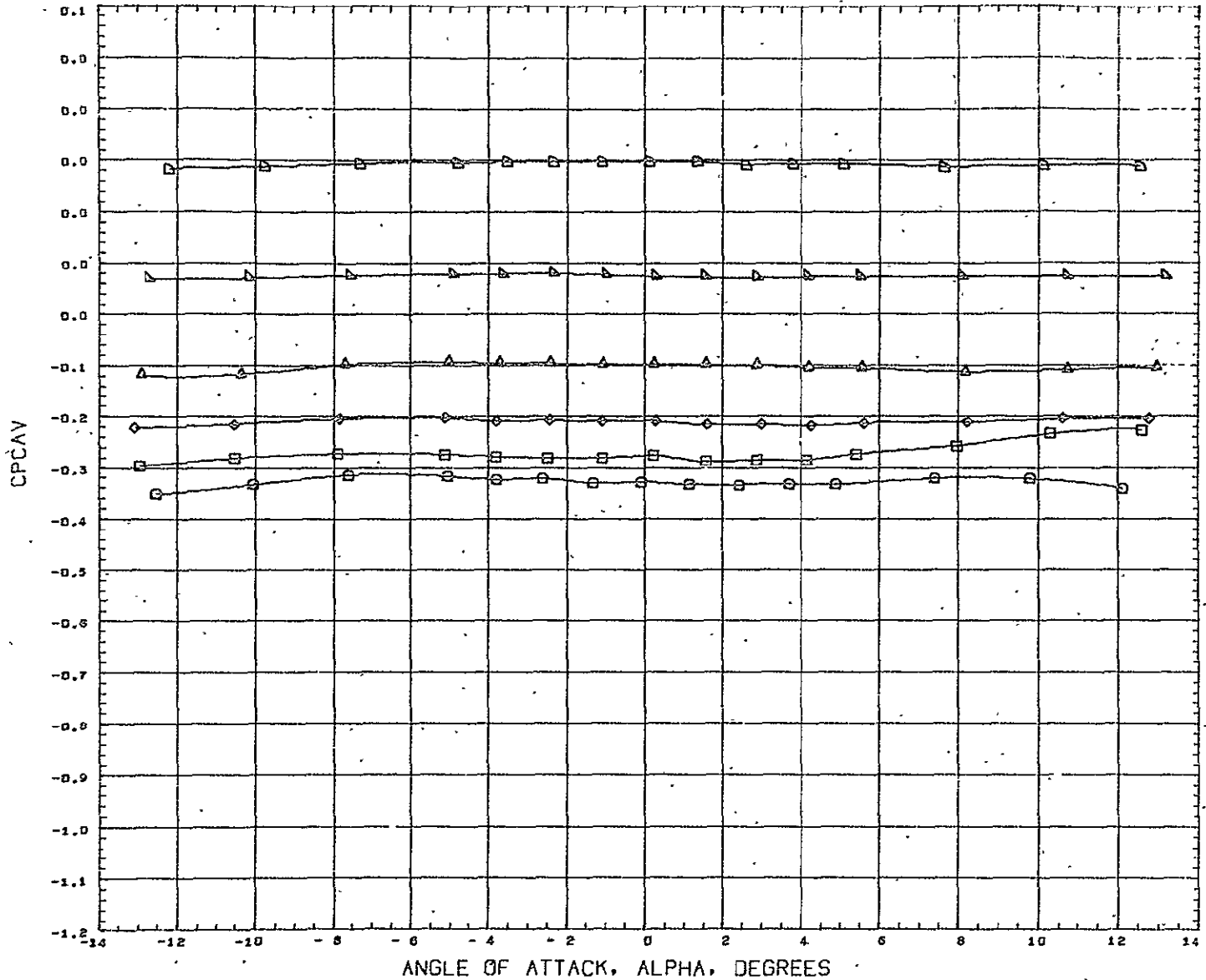
REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=0.0



PARAMETRIC VALUES						REFERENCE INFORMATION		
SYMBOL	MACH	BETA	ORBINC	HTAIL	DATA HIST. CODE	REFS	SCALE	PERCENT
○	0.903	-0.090	0.000	0.000		REFS	1.3960	SQ. IN.
□	1.001	4.000	0.000	0.000		REFL	1.3330	INCHES
◇	1.101	0.000				REFB	1.3330	INCHES
△	1.202					XHRP	5.2640	INCHES
▽	1.358					YHRP	0.0000	INCHES
◻	1.965					ZHRP	0.0000	INCHES

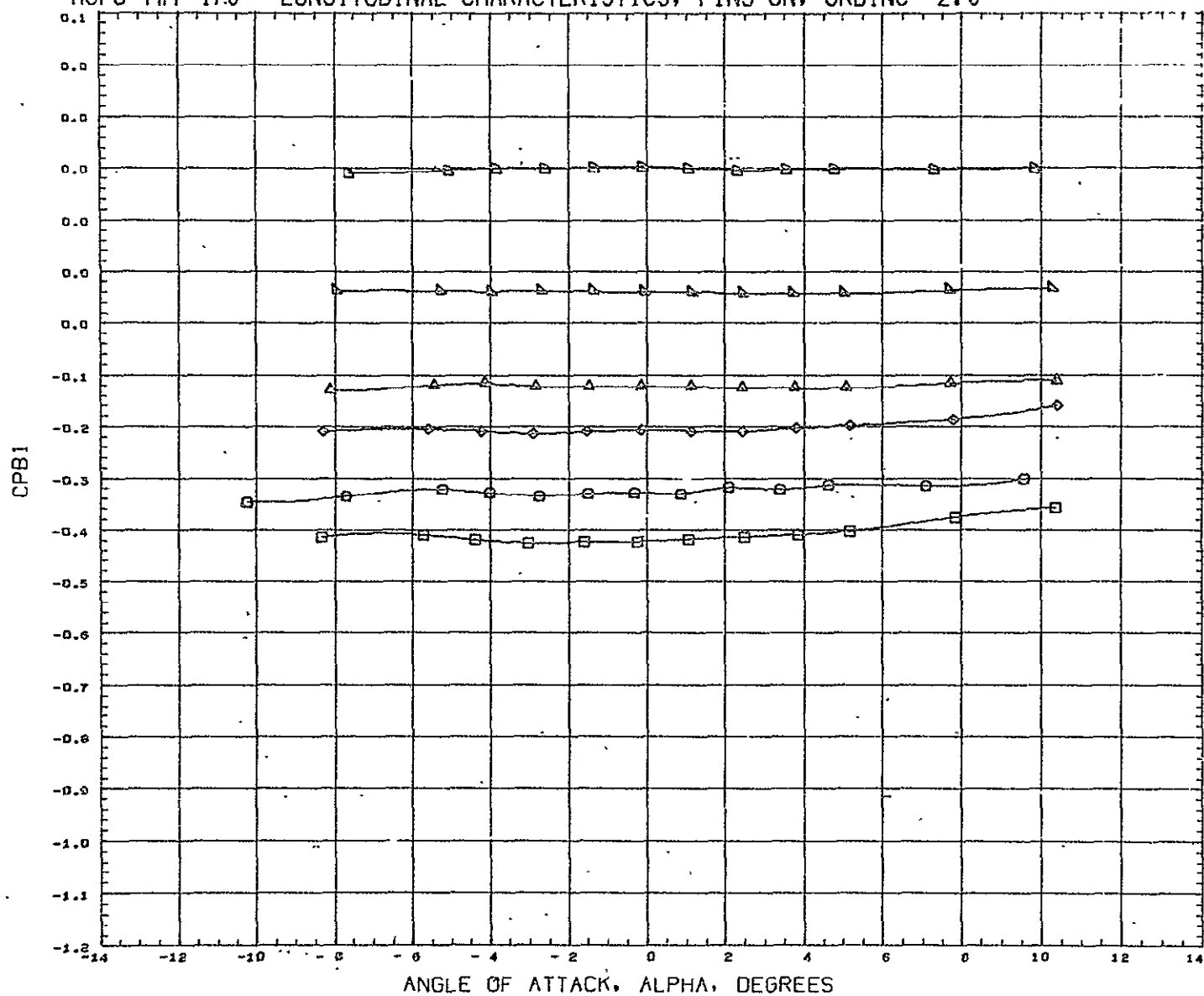
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=0.0



MSOL	MACH	PARAMETRIC VALUES			
○	0.903	BETA	- 0.090	ORBINC	0.000
□	1.001	WINGINC	4.000	HTAIL	0.000
◇	1.101	FWIB	0.000		
△	1.202				
▽	1.456				
∩	1.965	DATA HIST. CODE	#A		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

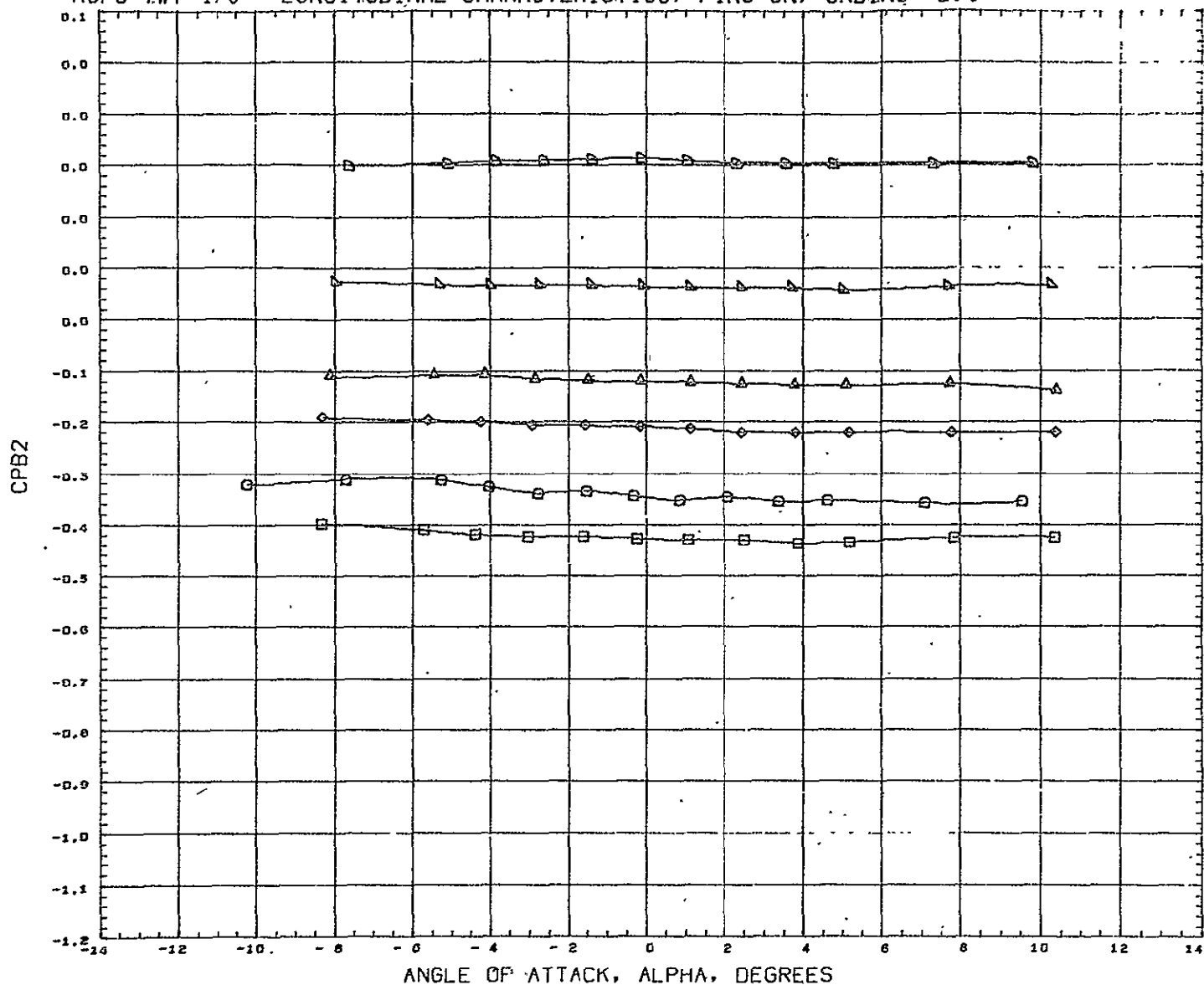
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-2.0



SYMBOL	MACH	PARAMETRIC VALUES			
□	0.899	BETA	0.070	ORBINC	-2.000
◇	0.993	WINGINC	4.000	HTAIL	0.000
△	1.105	PHIB	0.000		
▽	1.190				
◁	1.456				
○	1.956	DATA HIST. CODE	*A		

REFERENCE INFORMATION		
REFS	1.3960	SQ.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-2.0



SYMBOL	MACH	PARAMETRIC VALUES				REFERENCE INFORMATION		
○	0.899	BETA	-	0.070	ORBINC - 2.000	REFS	1.3960	SQ. IN.
□	0.993	WINGINC	4.000	NTAIL	0.000	REFL	1.3330	INCHES
◇	1.105	PHIB	0.000			REFB	1.3330	INCHES
△	1.196					XMRP	5.2640	INCHES
▽	1.456					YMRP	0.0000	INCHES
◻	1.956	DATA HIST. CODE	#A			ZMRP	0.0000	INCHES
						SCALE	0.3366	PERCENT

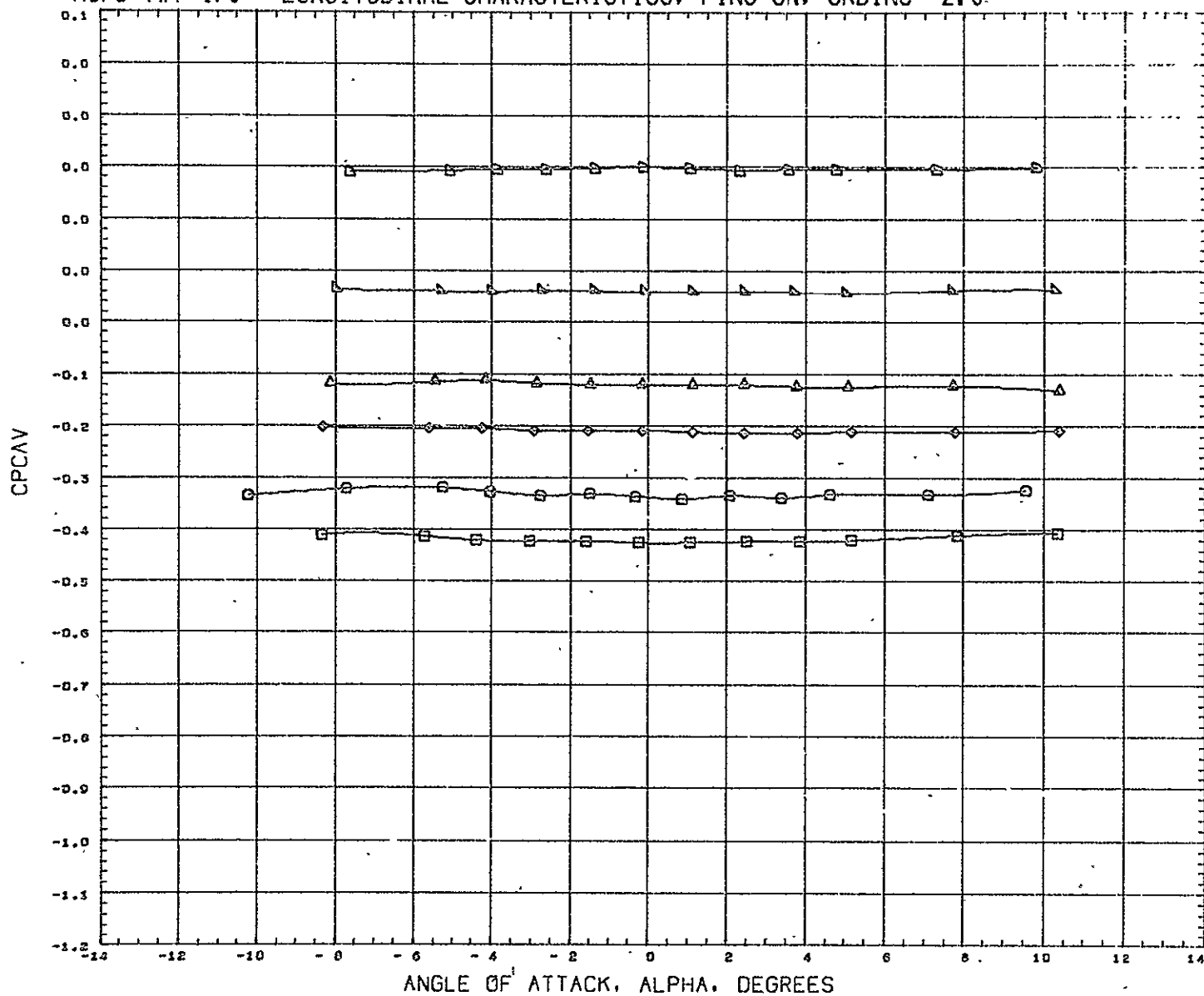
TWT470 S-IC/GAC ORBITER BF10WHVS FINS ON

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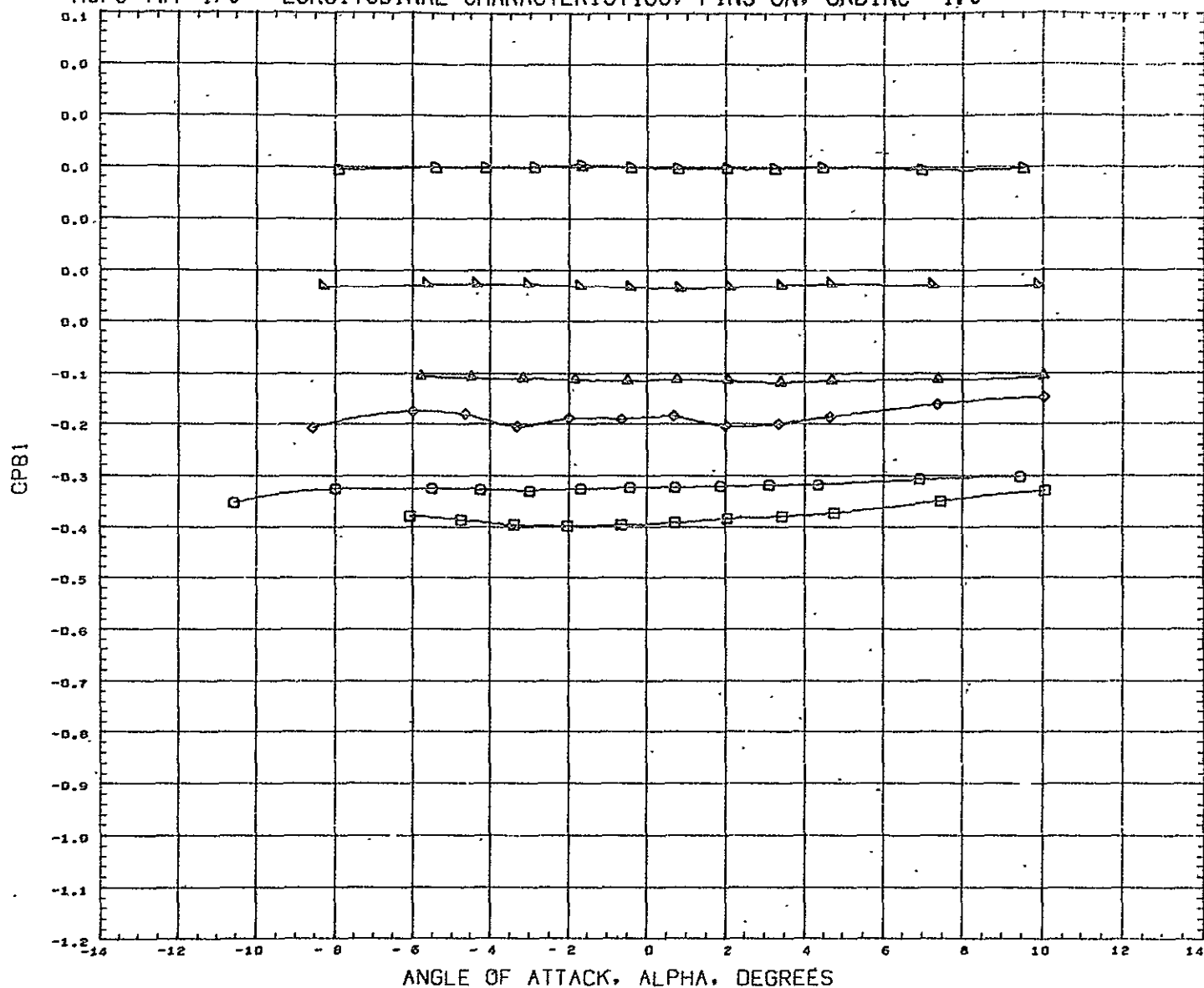
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON; ORBINC=-2.0



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.899	BETA	- 0.070	ORBINC	- 2.000
□	0.993	WINGINC	4.000	HTAIL	0.000
◇	1.105	PHIB	0.000		
△	1.195				
●	1.458				
■	1.956	DATA HIST. CODE	4A		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCNT

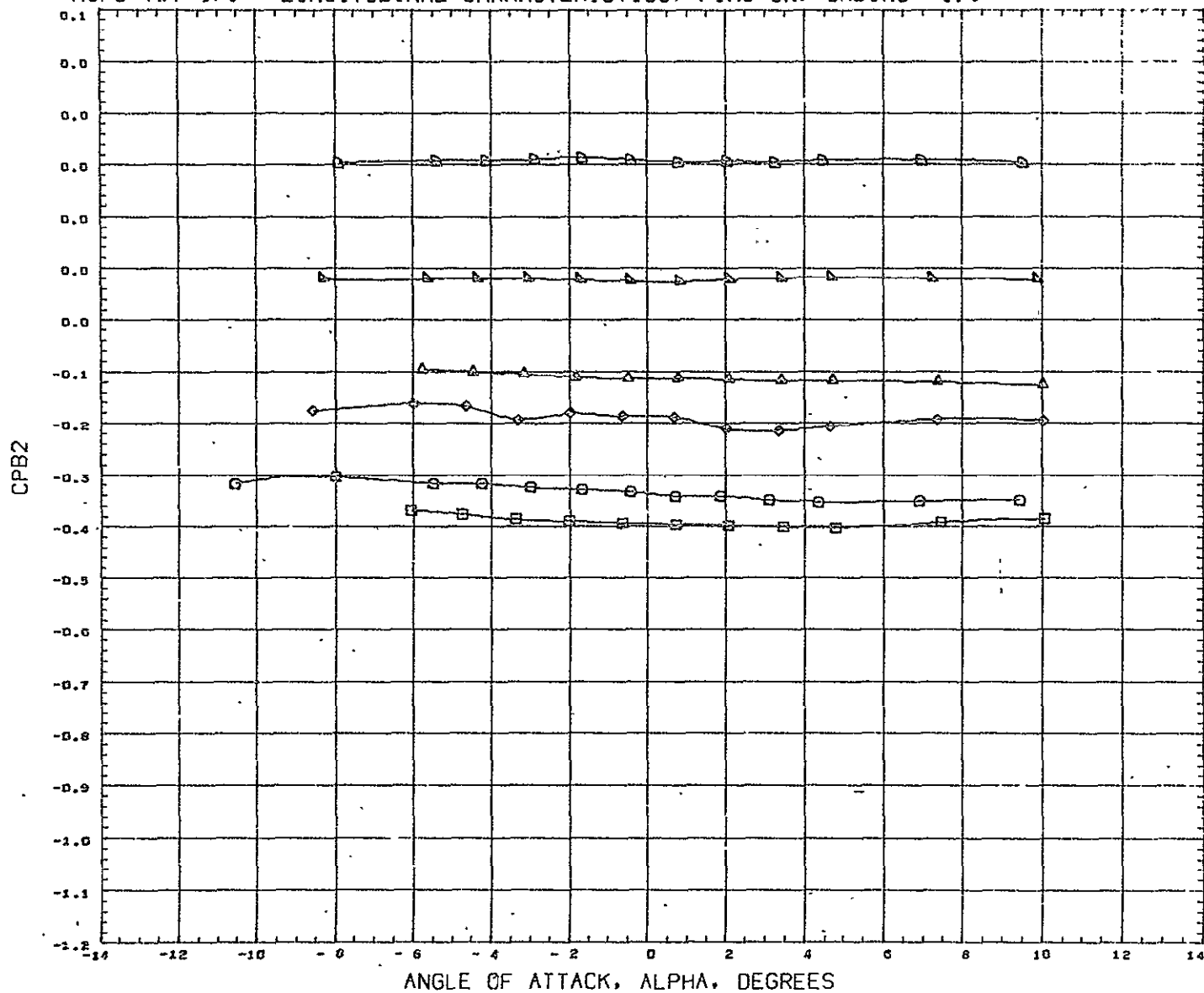
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-4.0



MSOL MACH PARAMETRIC VALUES
 O 0.991 BETA - 0.050 ORBINC - 4.000
 □ 1.000 WINGINC 4.000 HTAIL 0.000
 ◇ 1.098 FHIE 0.000
 △ 1.193
 ▽ 1.450
 ∩ 1.950 DATA HIST. CODE #A

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XNRP 5.2640 INCHES
 YNRP 0.0000 INCHES
 ZNRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

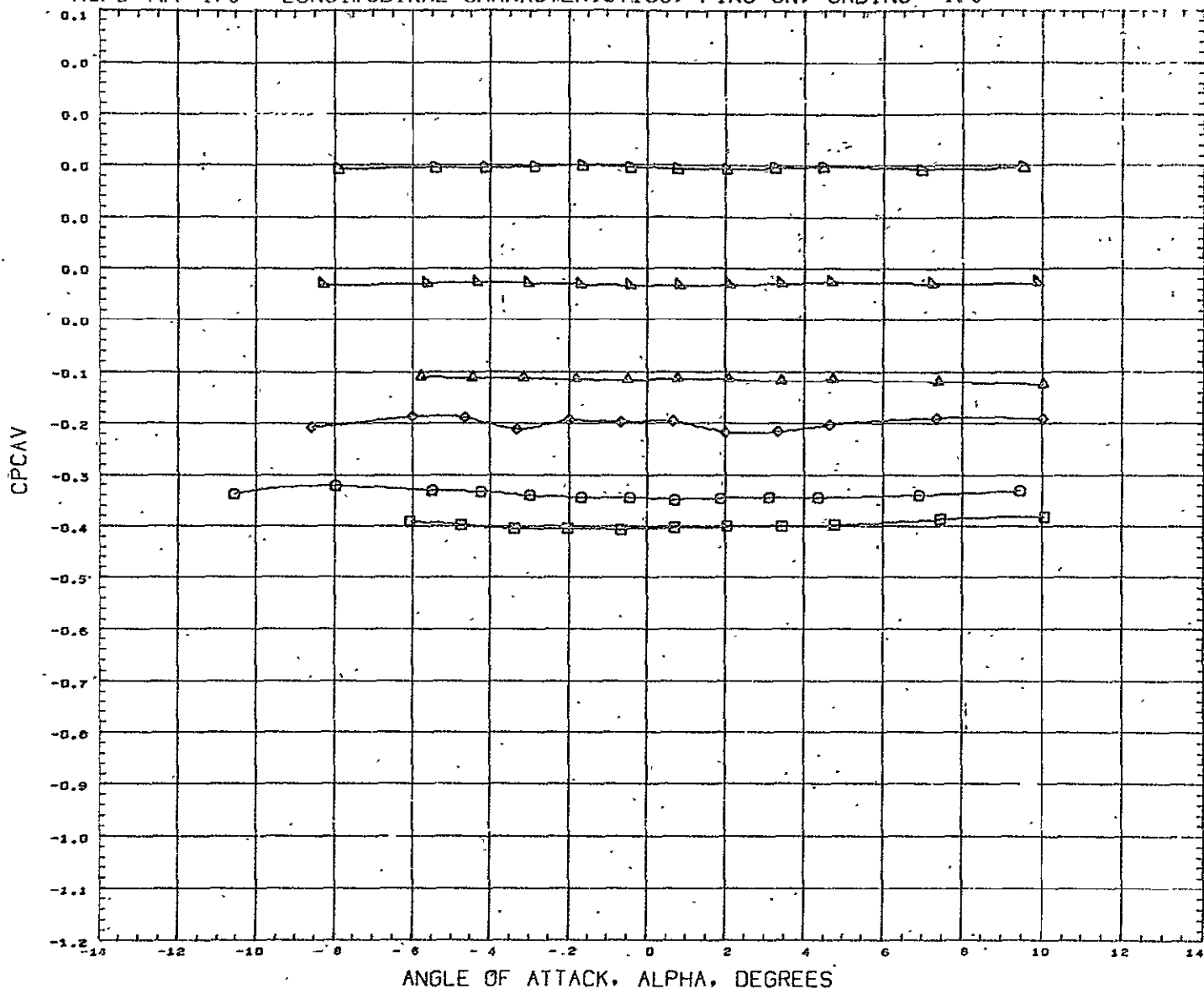
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-4.0



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.901	BETA	- 0.050	ORBINC	- 4.000
□	1.000	WNGINC	4.000	HTAIL	0.000
◇	1.098	PHIB	0.000		
△	1.193				
▽	1.450				
D	1.950	DATA HIST. CODE	#A		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

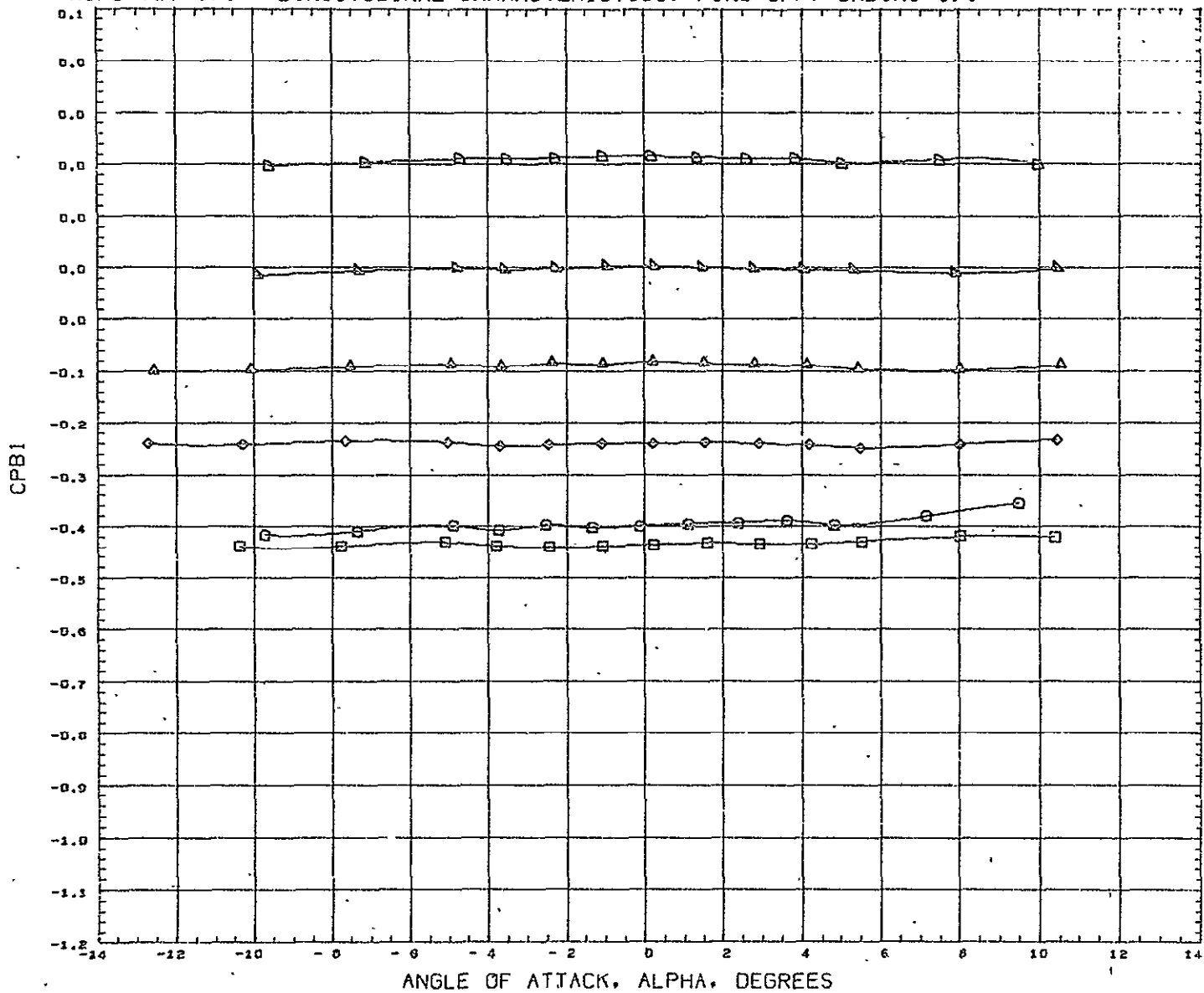
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-4.0



SYMBOL	MACH	PARAMETRIC VALUES			
□	0.901	BETA	- 0.030	ORBINC	- 4.000
◇	1.000	WNGINC	4.000	HTAIL	0.000
△	1.098	PHIB	0.000		
▽	1.193				
◇	1.458				
□	1.950	DATA HIST. CODE	*A		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

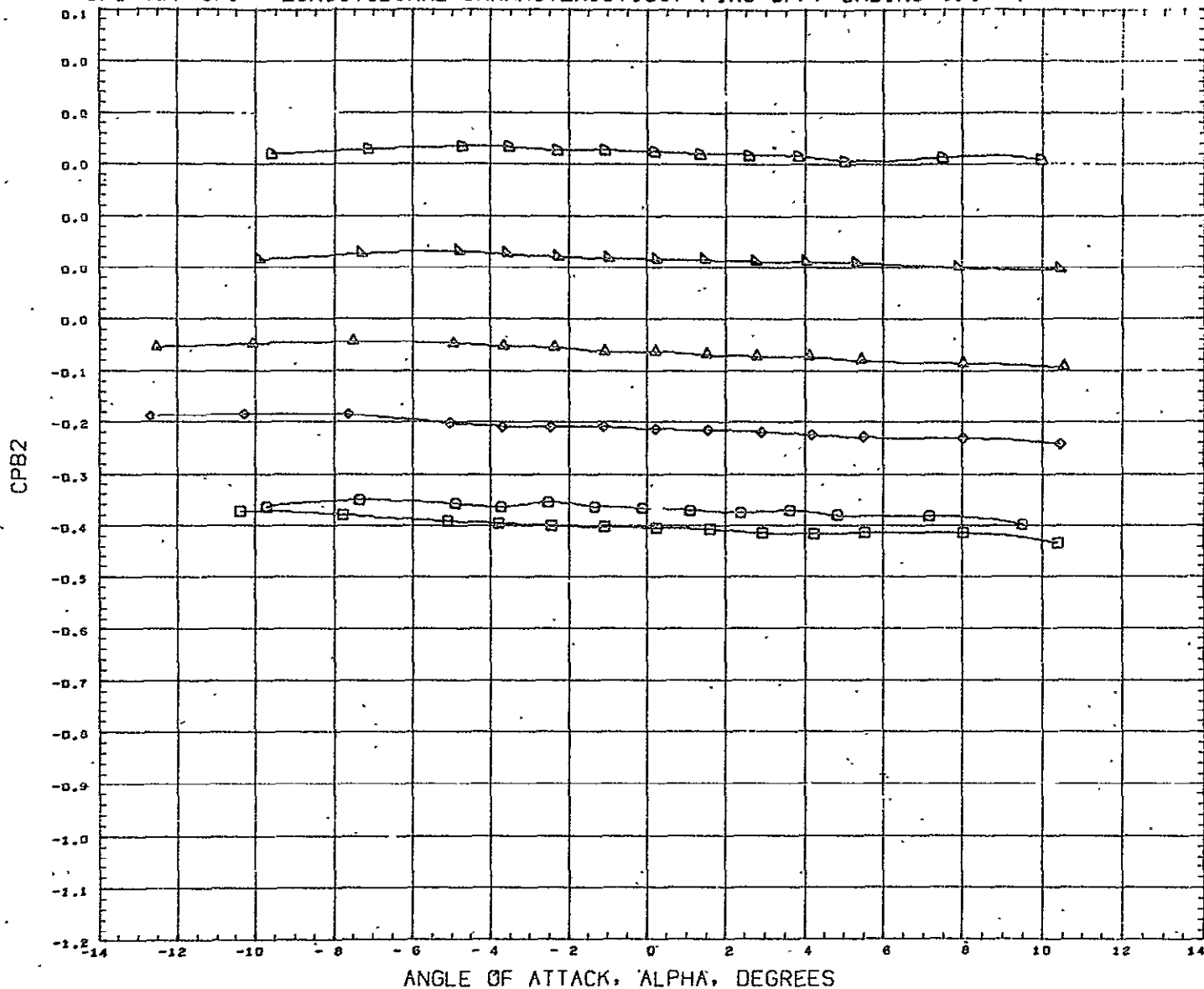
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=0.0



MSFC	HACH	PARAMETRIC VALUES			
0	0.039	BETA	- 0.050	ORBINC	0.000
0	0.993	WINGINC	4.000	HTAIL	0.000
0	1.101	PHIB	0.000		
Δ	1.201				
▽	1.457				
∩	1.951	DATA HIST. CODE	4A		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=0.0



SYMBOL	NACH	PARAMETRIC VALUES	REFERENCE INFORMATION
□	0.899	BETA - 0.050 ORBINC. 0.000	REFS. 1.3960 SQ. IN.
□	0.993	WINGINC 4.000 HTAIL 0.000	REFL 1.3330 INCHES
◇	1.101	PHIB 0.000	REFB 11.3330 INCHES
△	1.201		XMRP 5.2640 INCHES
▽	1.457		YMRP 0.0000 INCHES
□	1.951	DATA HIST. CODE *A	ZMRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

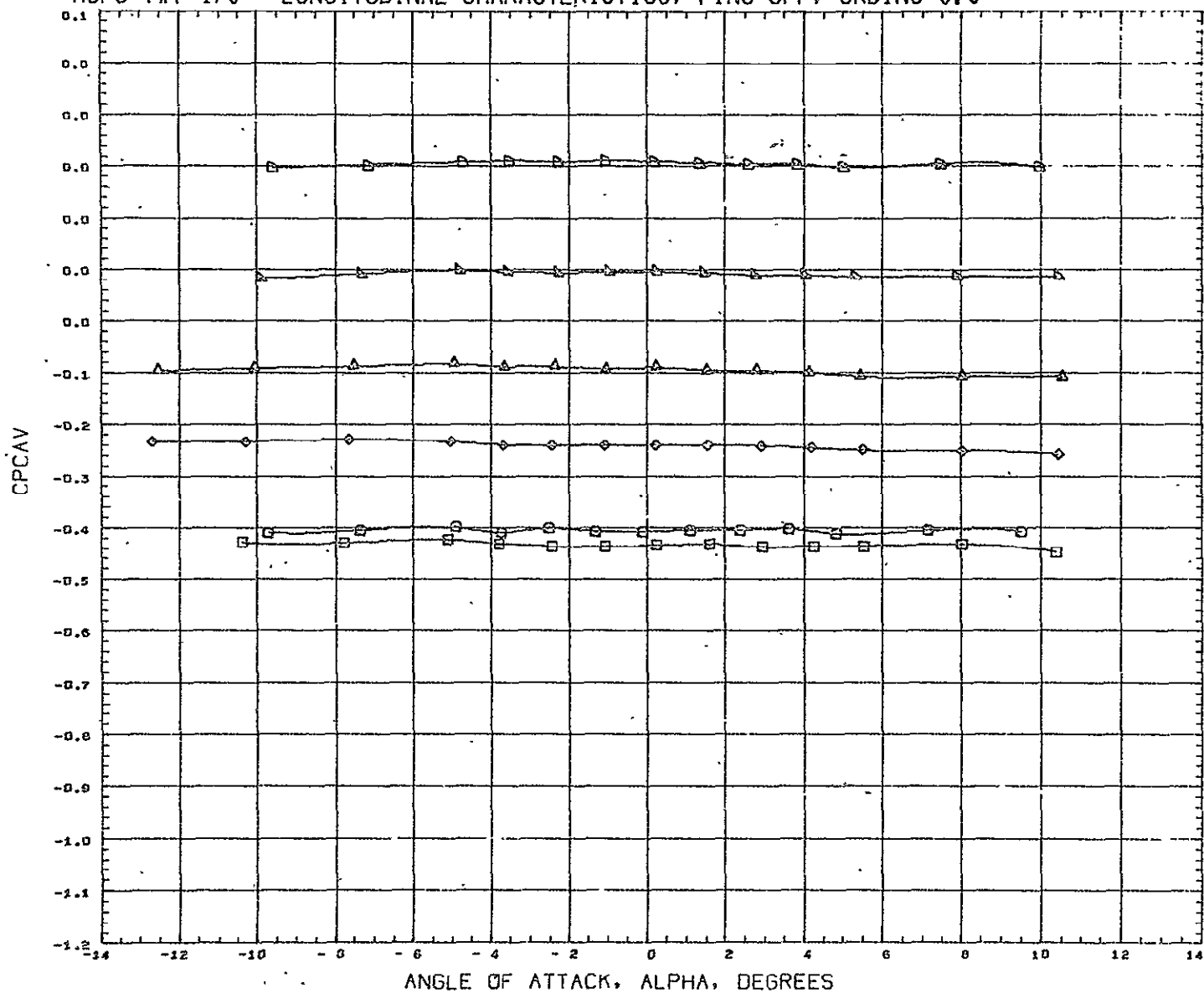
TWT470 S-IC/GAC ORBITER BOWHVS

FINS OFF/

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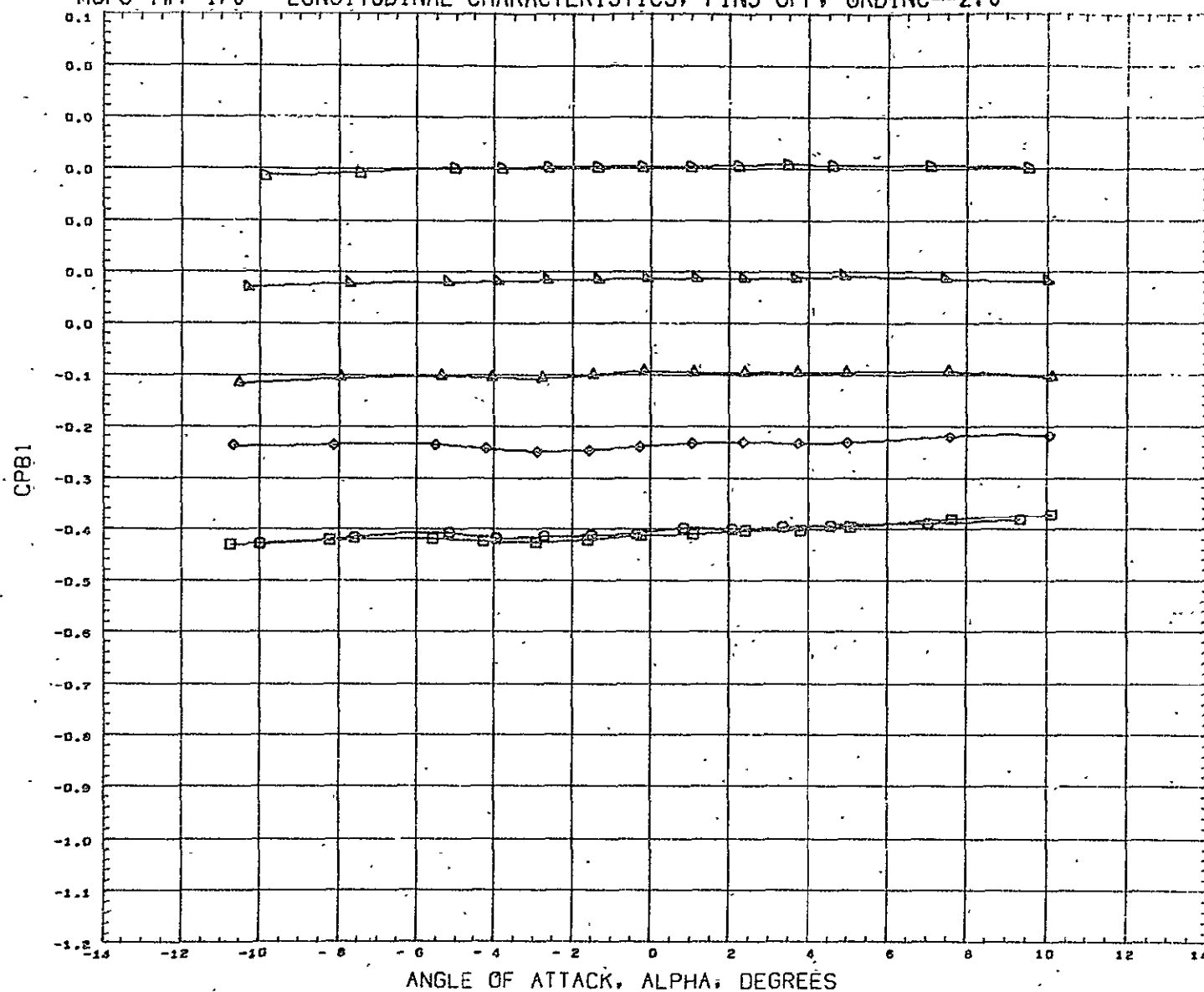
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=0.0



SYMBOL	MACH	PARAMETRIC VALUES			
□	0.699	BETA	0.050	ORBINC	0.000
□	0.993	WINGINC	4.000	HTAIL	0.000
◇	1.101	PHIB	0.000		
△	1.201				
△	1.457				
□	1.951	DATA HIST. CODE	#A		

REFERENCE INFORMATION		
REFS	1.3960	50.1N.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

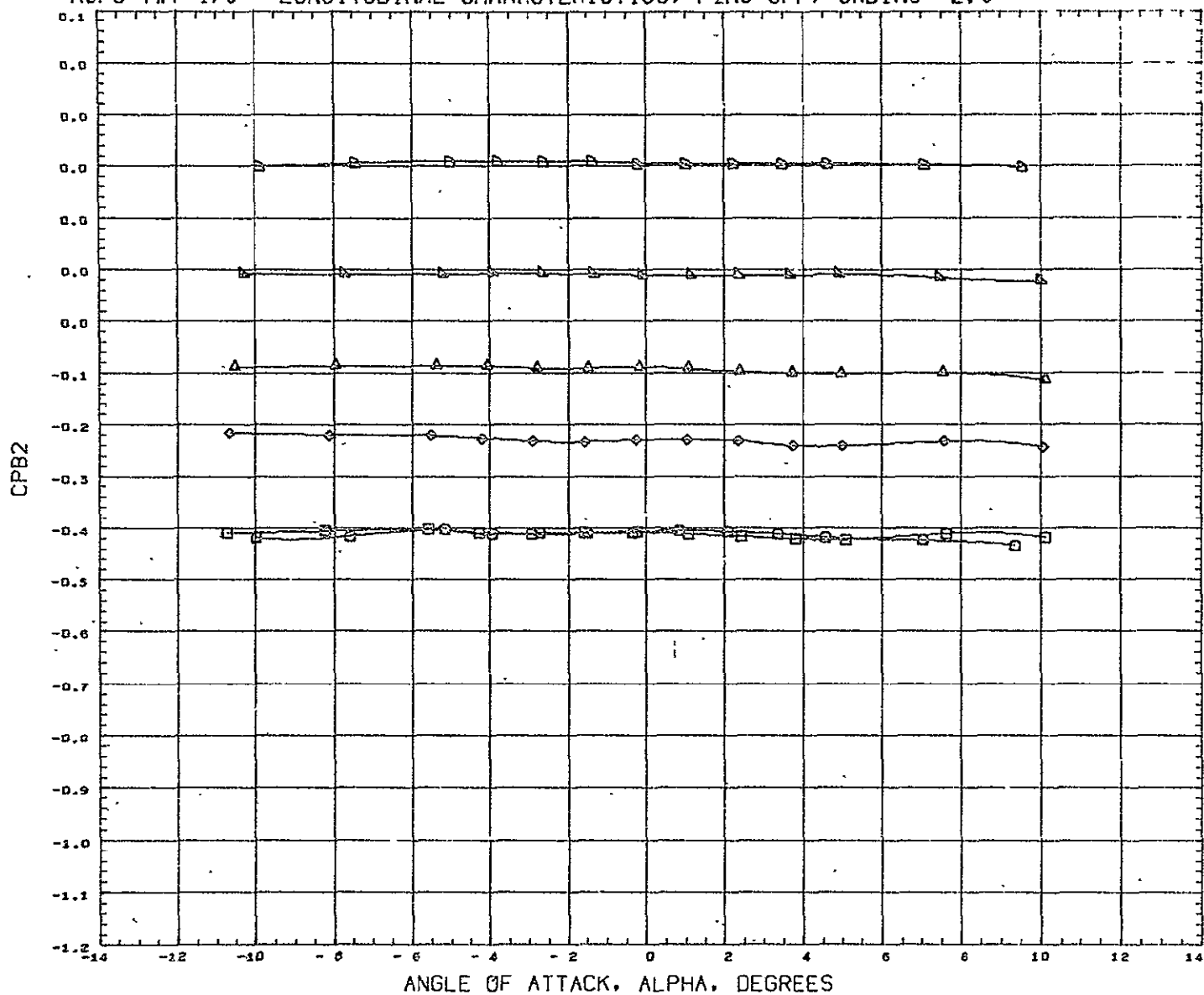
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=-2.0



SYMBOL	MACH	PARAMETRIC VALUES			
□	0.905	BETA	0.000	ORBINC	-2.000
◇	0.994	WINGINC	4.000	HTAIL	0.000
○	1.100	PHIB	0.000		
△	1.203				
▽	1.454				
D	1.900	DATA HIST. CODE	%A		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=-2.0



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.993	BETA	- 0.000	ORBINC	- 2.000
□	0.994	WNGINC	4.000	HTAIL	0.000
◇	1.100	PHIB	0.000		
△	1.293				
▽	1.434				
◻	1.980	DATA HIST. CODE	#A		

REFERENCE INFORMATION		
REFS	1.3960	SQ.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

TWT470 S-IC/GAC ORBITER BOWHVS

FINS OFF

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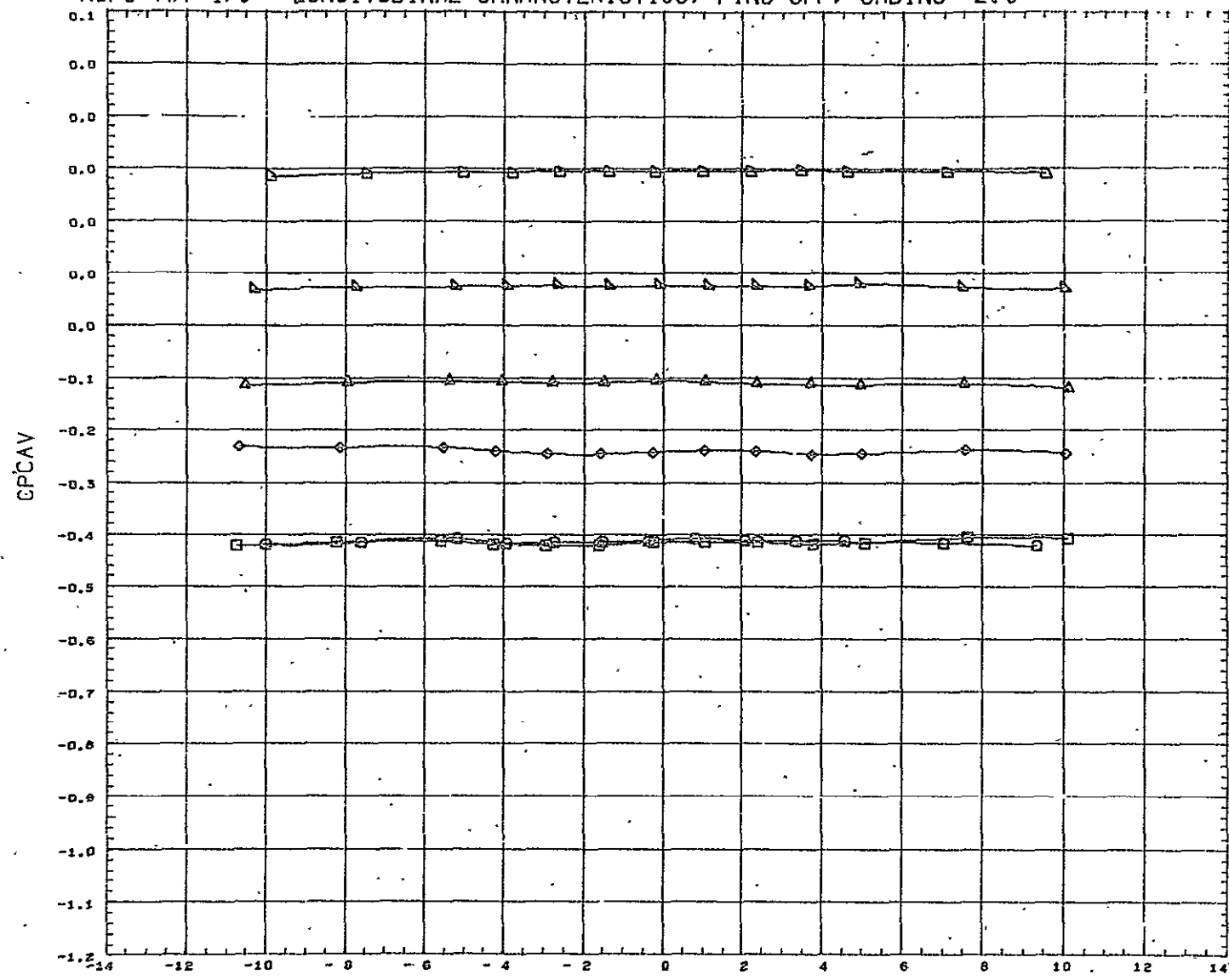
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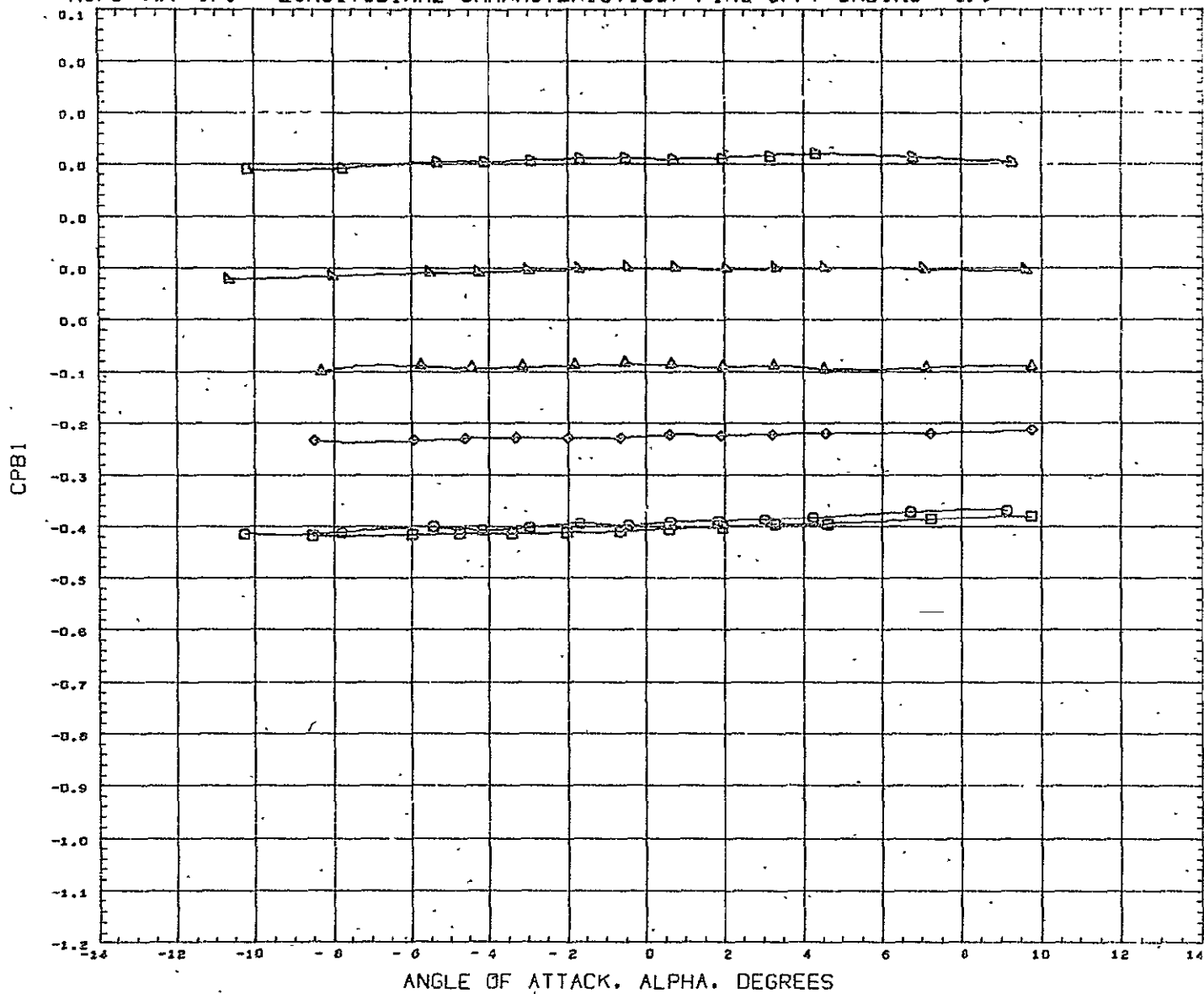
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=-2.0



ANGLE OF ATTACK, ALPHA, DEGREES

SYMBOL		PARAMETRIC VALUES				REFERENCE INFORMATION		
□	0.905	BETA	0.000	ORBINC	2.000	REFS	1.3960	50. IN.
□	0.994	WNGINC	4.000	HTAIL	0.000	REFL	1.3330	INCHES
◇	1.100	PHIB	0.000			REFB	1.3330	INCHES
△	1.203					XNRP	5.2640	INCHES
▽	1.434					YNRP	0.0000	INCHES
◇	1.960	DATA HIST. CODE	*A			ZHRP	0.0000	INCHES
						SCALE	0.3366	PERCNT

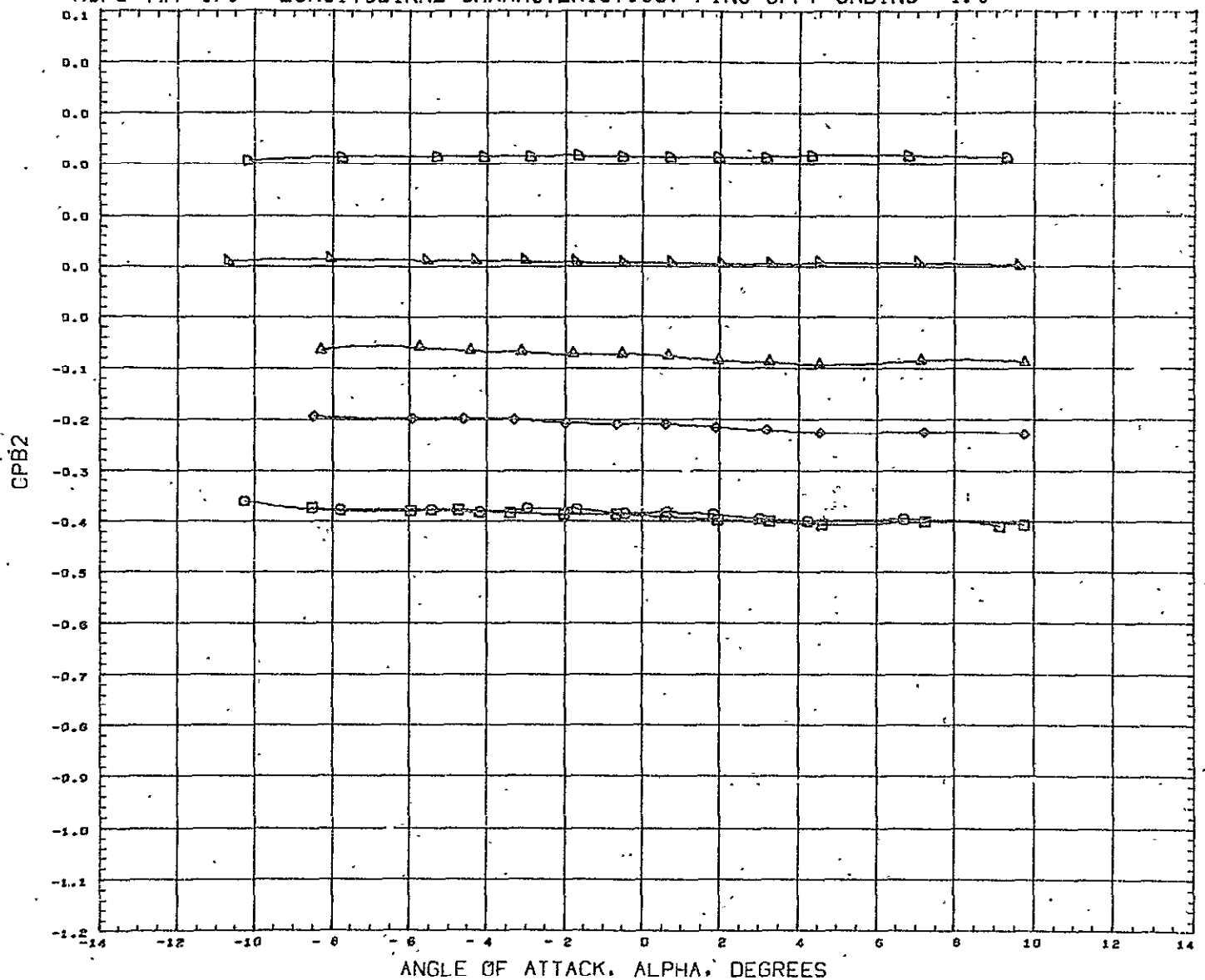
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=-4.0



SYMBOL	MACH	PARAMETRIC VALUES			
□	0.900	BETA	- 0.040	ORBINC	- 4.000
□	0.997	WNGINC	4.000	HTAIL	0.000
◇	1.100	PHIB	0.000		
△	1.195				
△	1.480				
D	1.952	DATA HIST. CODE	*A		

REFERENCE INFORMATION		
REFS	1.3960	SQ.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=-4.0



SYMBOL	MACH	PARAMETRIC VALUES				REFERENCE INFORMATION		
○	0.900	BETA	- 0.040	ORBINC	- 4.000	REFS	1.3960	sq.in.
□	0.997	WNGINC	4.000	HTAIL	0.000	REFL	1.3330	INCHES
◇	1.100	PHIB	0.000			REFB	1.3330	INCHES
△	1.199					XHRP	5.2640	INCHES
▽	1.400					YHRP	0.0000	INCHES
◊	1.952	DATA HIST. CODE	*A			ZHRP	0.0000	INCHES
						SCALE	0.3366	PERCENT

TWT470 S-IC/GAC ORBITER BOWHVS

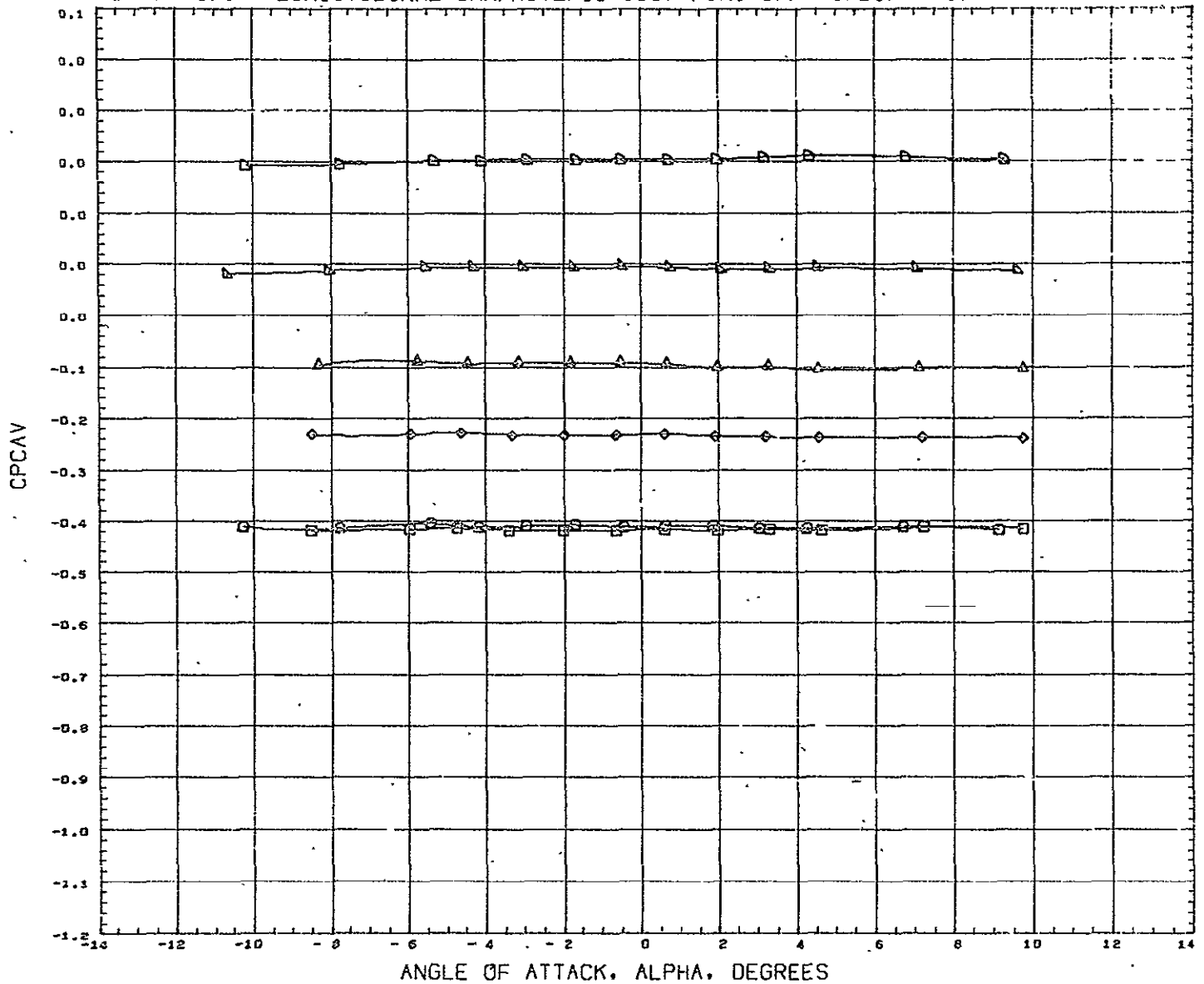
FINS OFF

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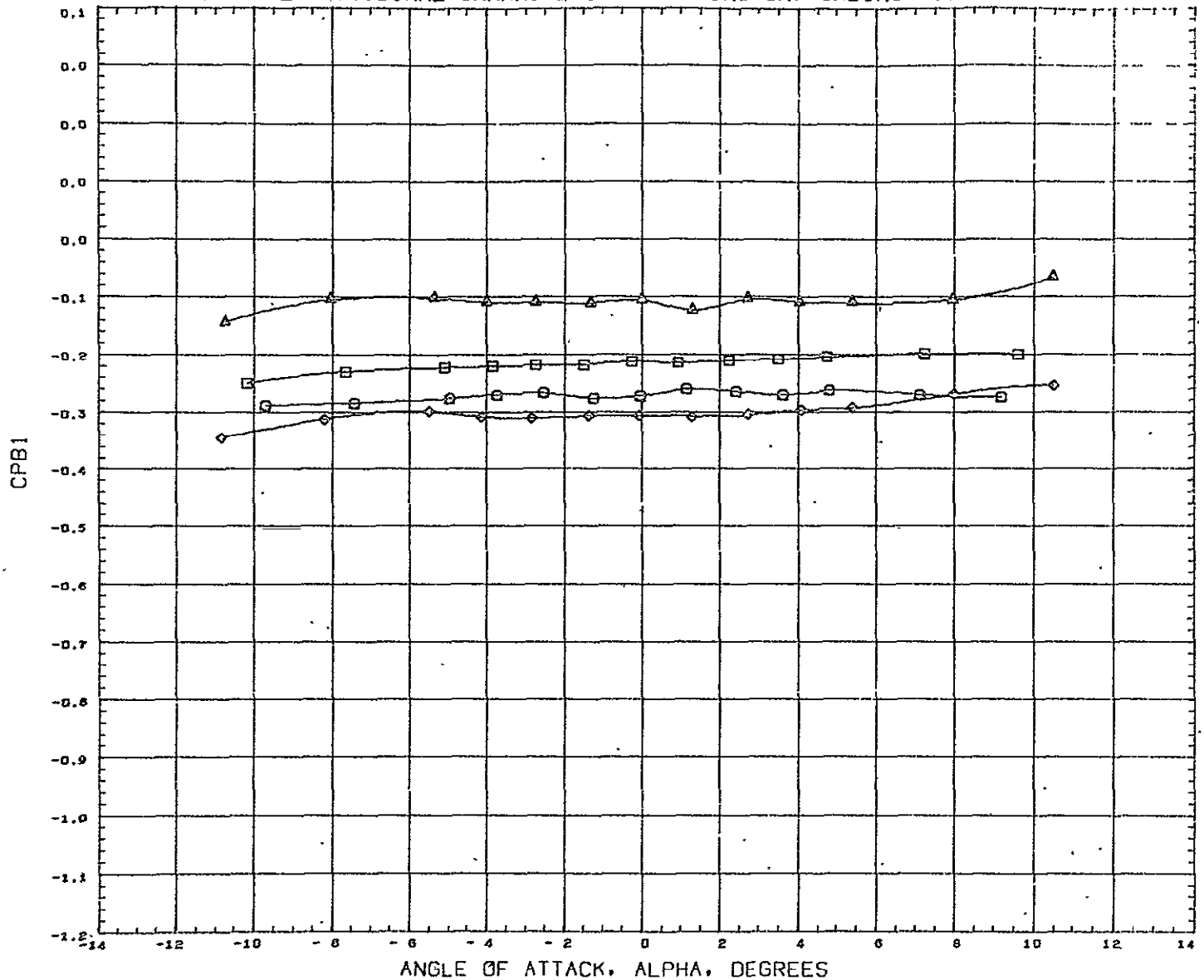
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS OFF, ORBINC=-4.0



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.900	BETA	- 0.040	ORBINC	- 4.000
◻	0.997	WINGINC	4.000	HTAIL	0.000
◊	1.100	PHIB	0.000		
△	1.199				
▽	1.450				
◻	1.952	DATA HIST. CODE	QA		

REFERENCE INFORMATION		
REFS	1.3960	50. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-1.05



SYMBOL	MACH	PARAMETRIC VALUES			
□	0.599	BETA	- 0.050	ORBINC	- 1.050
□	0.899	WINGINC	4.000	HTAIL	0.000
◇	0.997	PHIB	0.000		
Δ	1.095				

REFERENCE INFORMATION		
REFS	1.3980	88. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

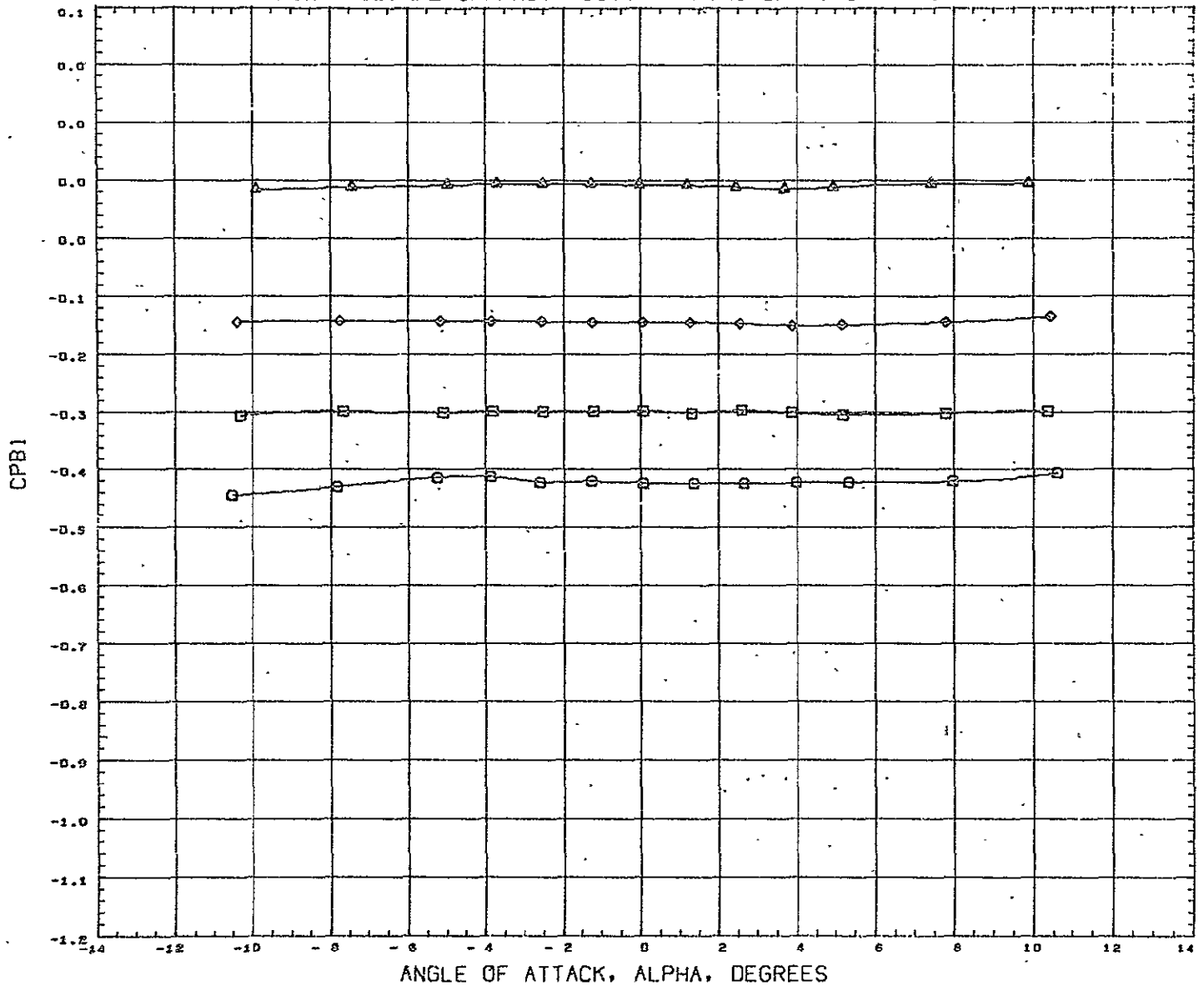
REFERENCE FILE

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

(A24081) 26 JAN 71

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-1.05

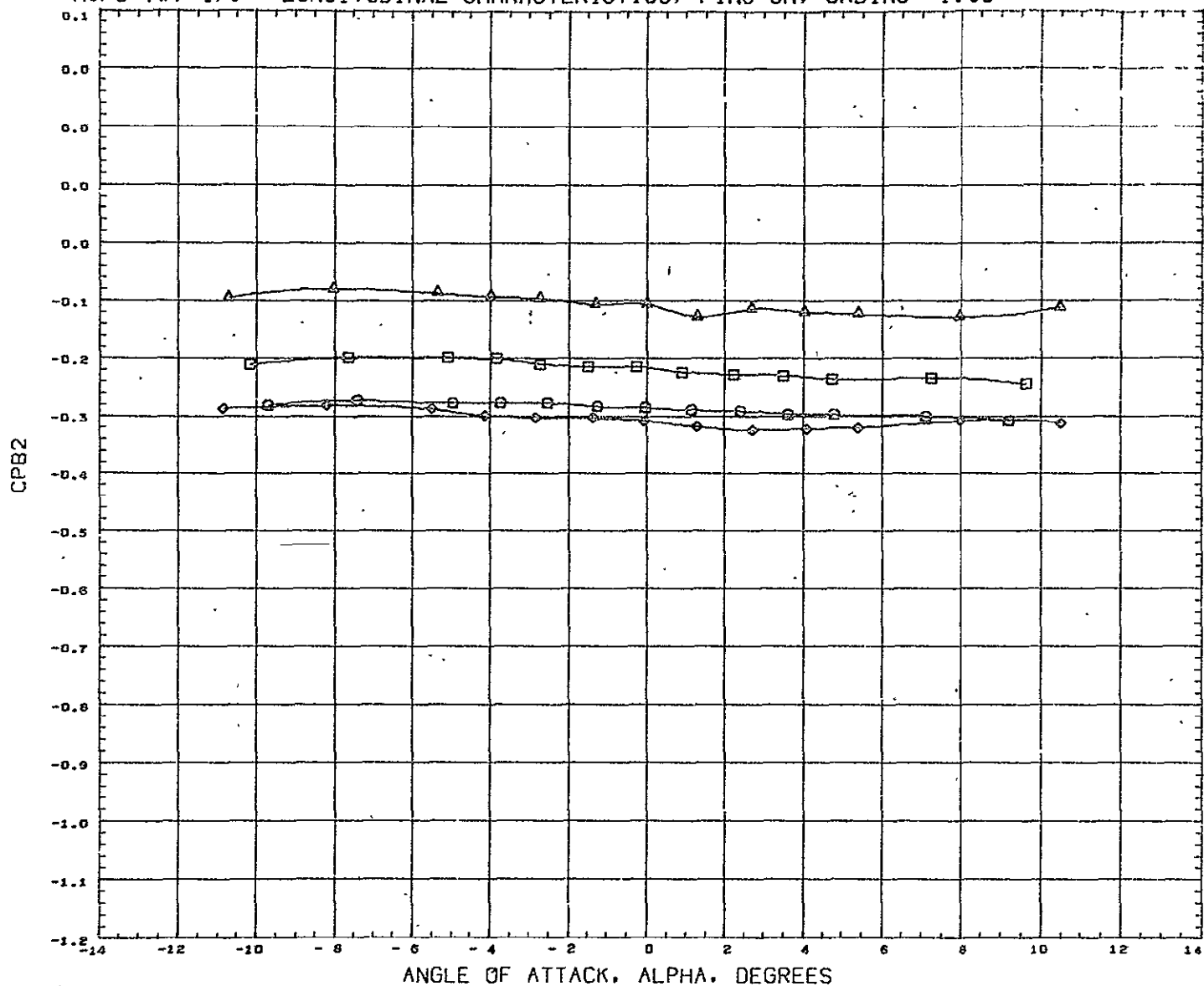


SYMBOL	MACH	PARAMETRIC VALUES			
○	1.195	BETA	-0.050	ORBINC	-1.050
□	1.303	WINGINC	4.000	HTAIL	0.000
◇	1.456	PH1B	0.000		
△	1.967				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3969	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YHRF	0.0000	INCHES
ZHRF	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-1.05



PARAMETRIC VALUES	
MBOL	NACH
□	0.599
□	0.899
◇	0.997
△	1.095

REFERENCE FILE

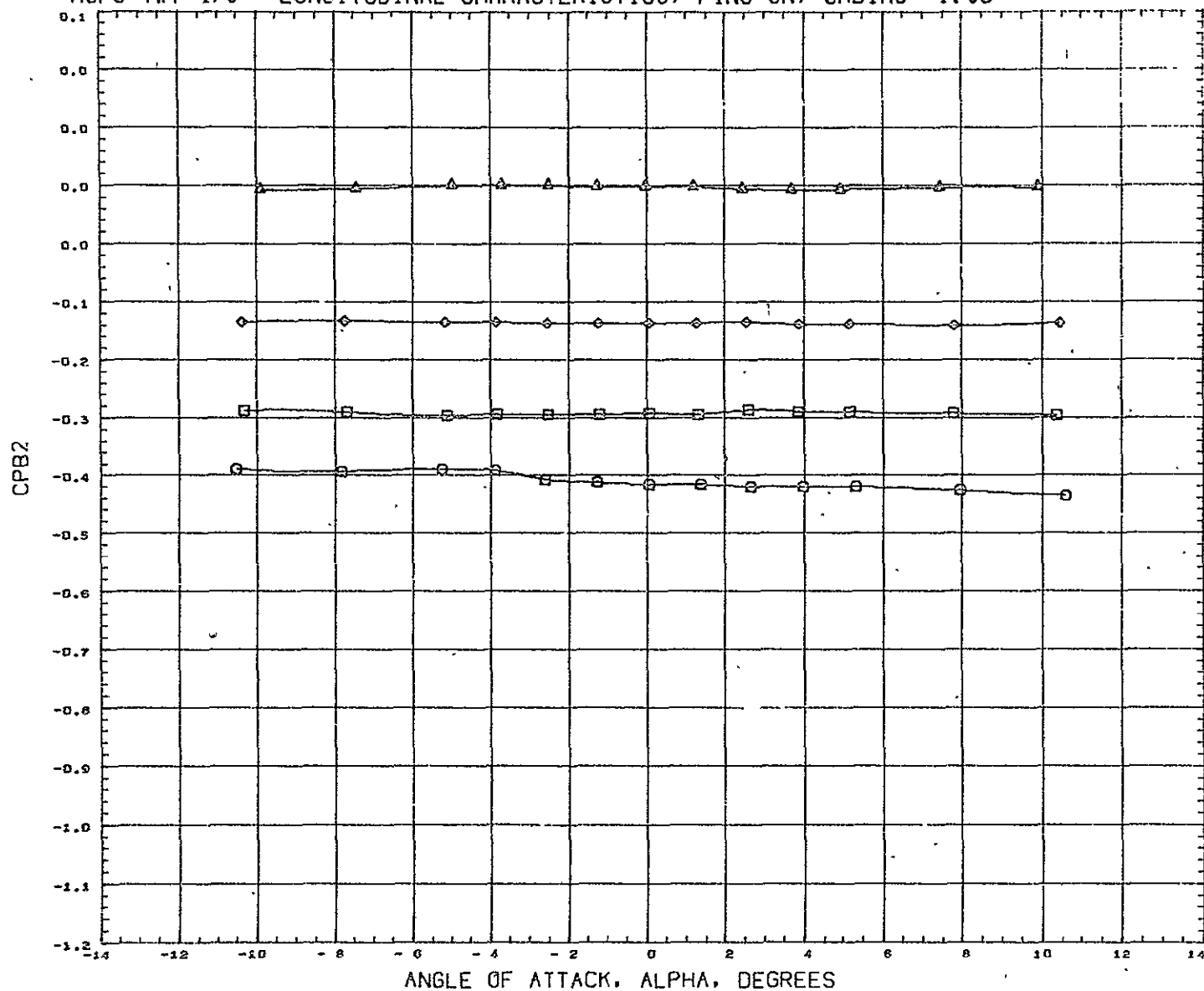
REFERENCE INFORMATION	
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REFL	1.3330
REFB	1.3330
XMRP	5.2640
YMRP	0.0000
ZMRP	0.0000
SCALE	0.3366

WT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-1.05

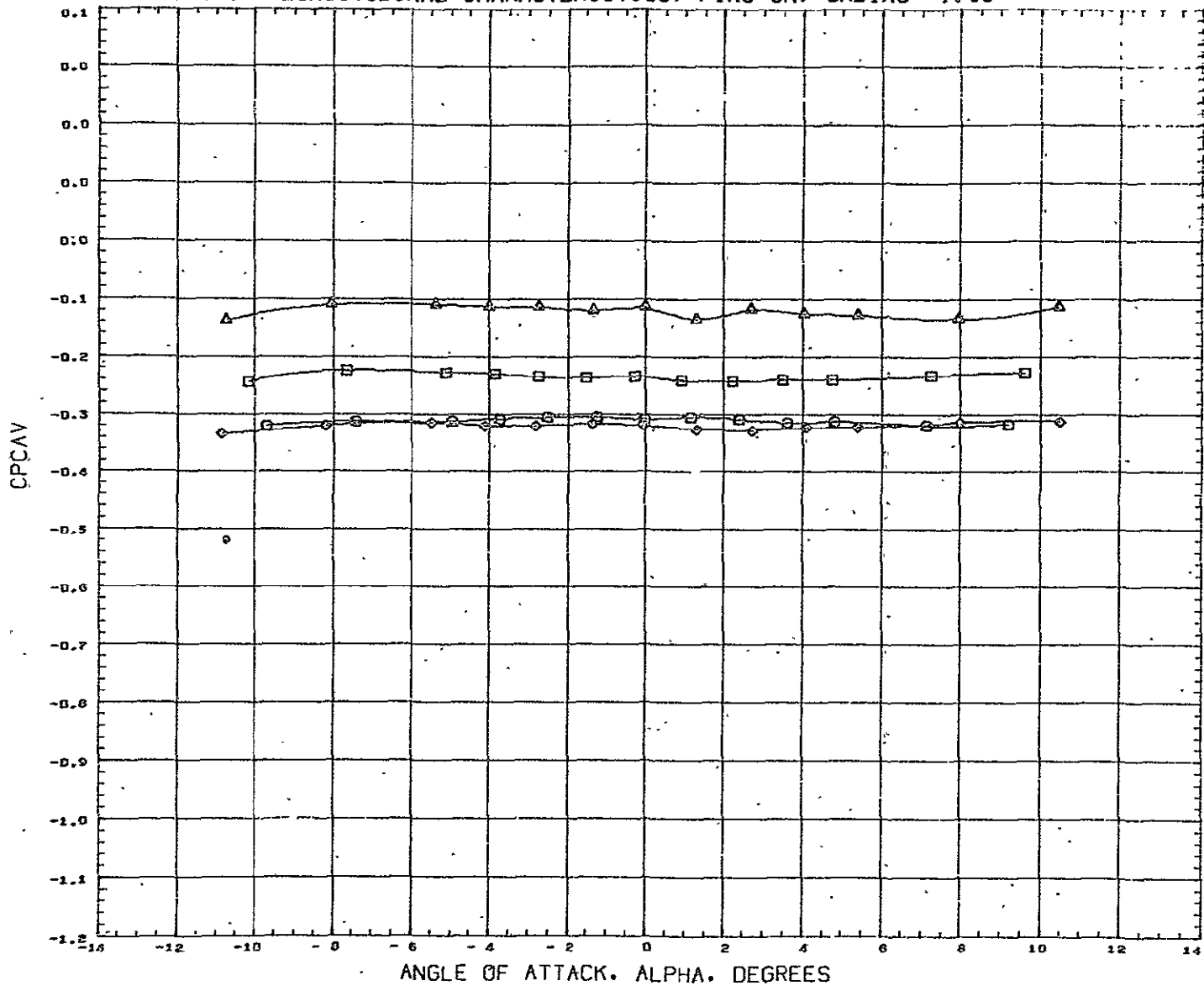


SYMBOL		PARAMETRIC VALUES			
□	1.195	BETA	- 0.050	ORBINC	- 1.050
□	1.303	UNGINC	4.000	HTAIL	0.005
◇	1.436	PHIB	0.000		
△	1.957				

REFERENCE INFORMATION		
REFS	1.3960	50. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-1.05



SYMBOL MACH PARAMETRIC VALUES
 □ 0.599 BETA - 0.050 ORBINC - 1.050
 □ 0.899 WINGINC 4.000 HTAIL 0.000
 ◇ 0.997 PHID 0.000
 Δ 1.095

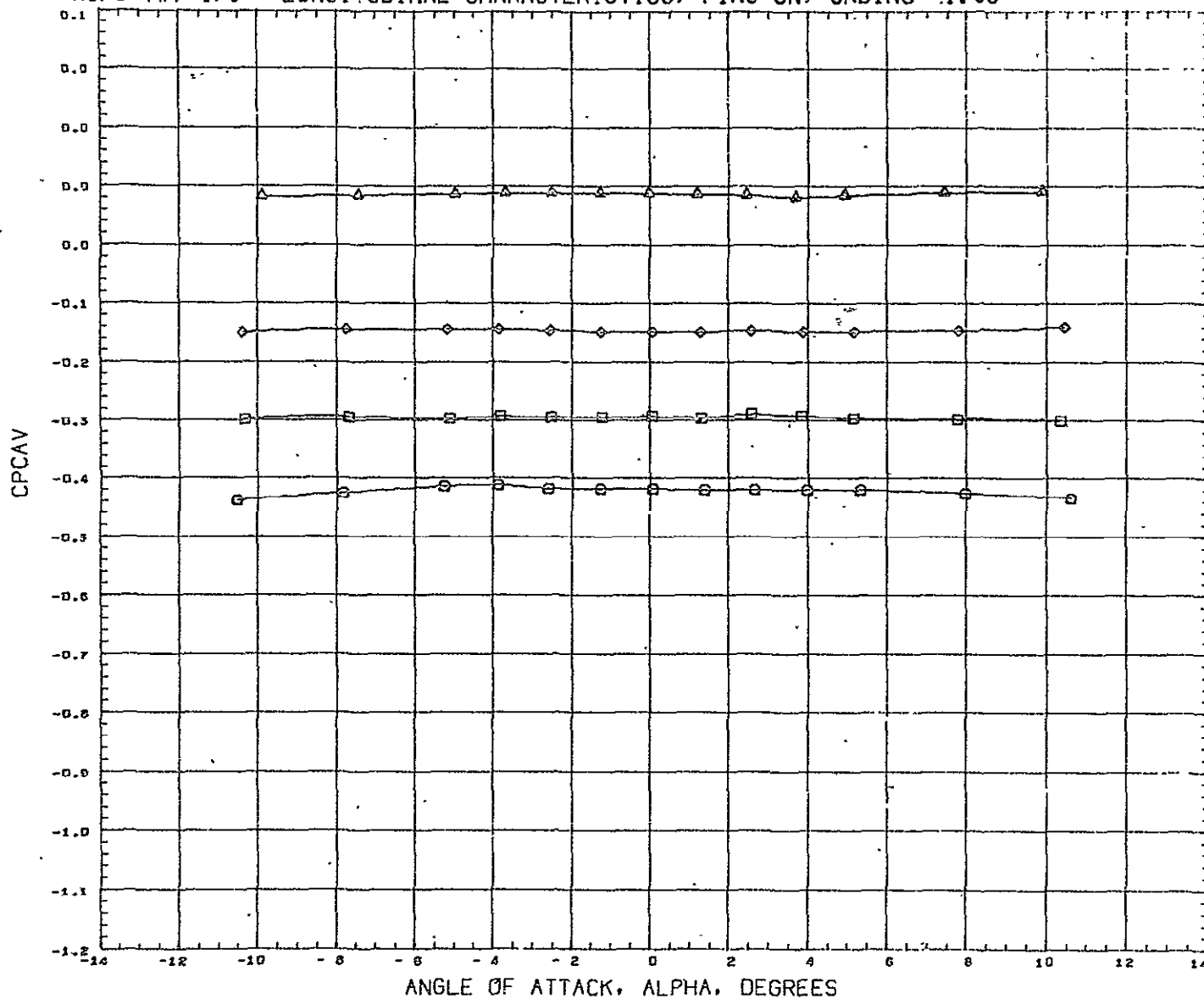
REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

REFERENCE FILE

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, ORBINC=-1.05

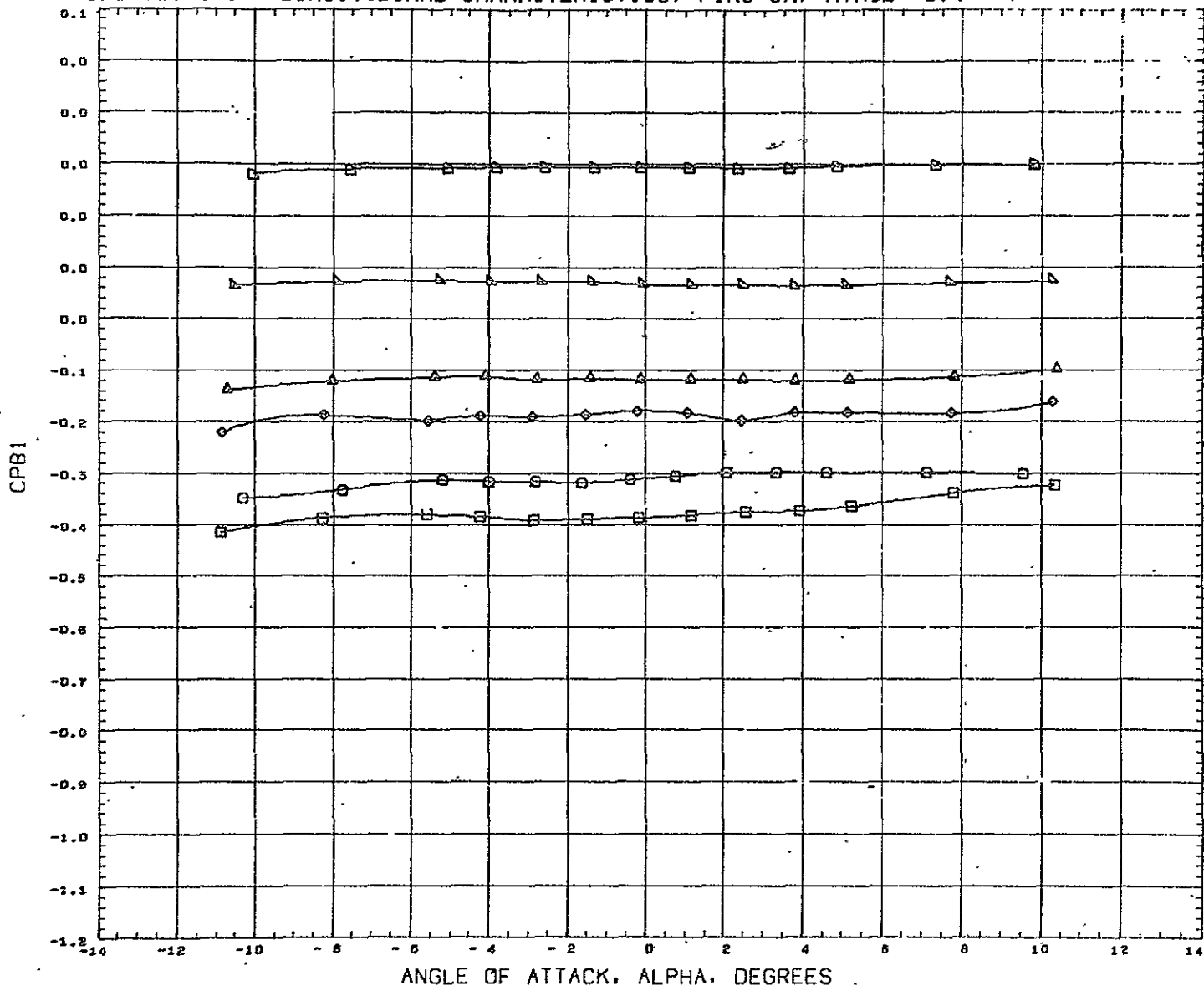


SYMBOL	MACH	PARAMETRIC VALUES			
\circ	1.195	BETA	- 0.050	ORBINC	- 1.050
\square	1.303	WINGINC	4.000	HTAIL	0.000
\diamond	1.456	PHIB	0.000		
Δ	1.987				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, HTAIL=-5.0



SYMBOL	MACH	PARAMETRIC VALUES			
□	0.693	BETA	- 0.020	ORBINC	- 1.050
△	0.995	WNGINC	4.000	HTAIL	- 5.000
◇	1.093	PHIB	0.000		
○	1.199				
×	1.454				
+	1.961	DATA HIST. CODE	*A		

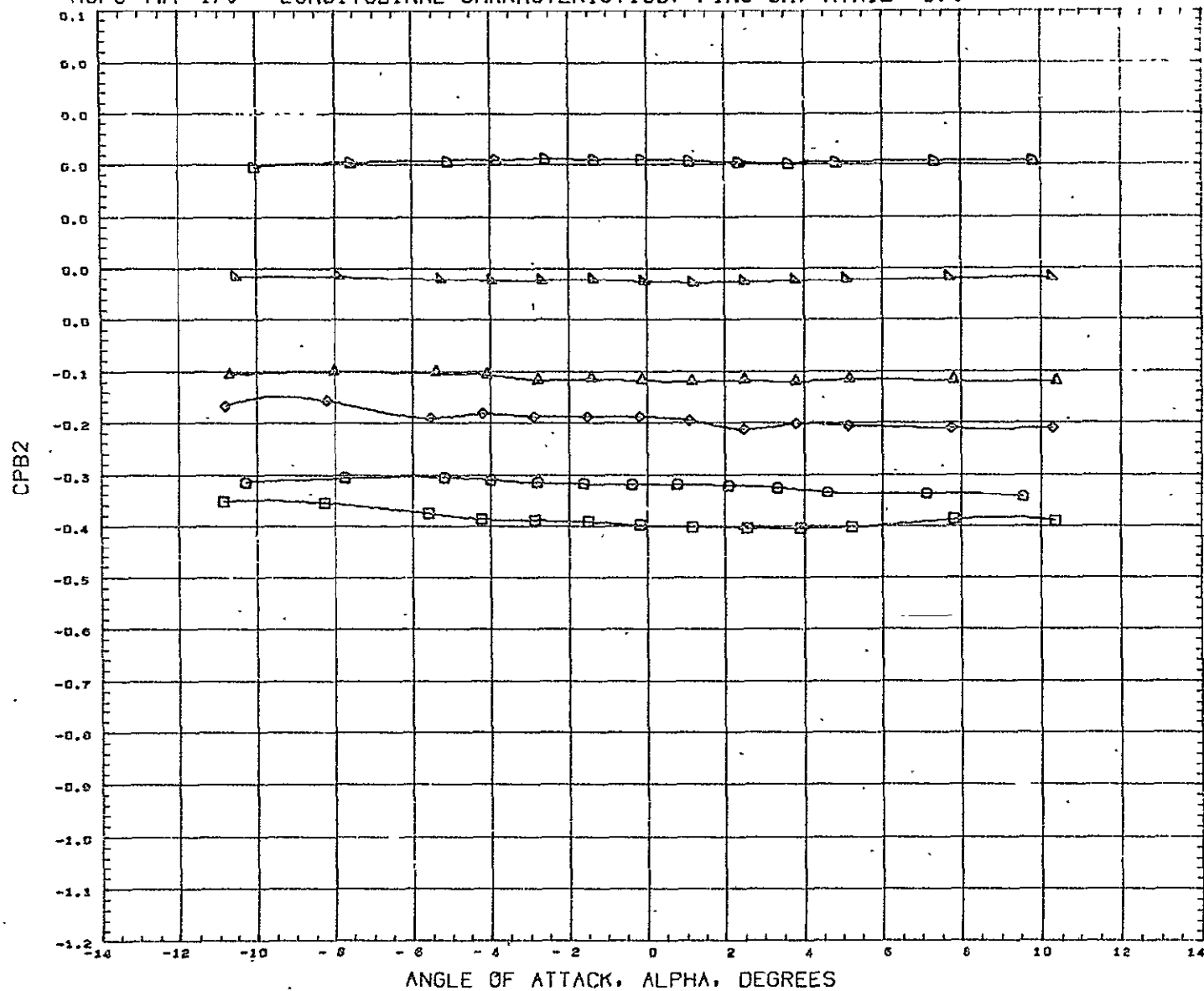
REFERENCE INFORMATION		
REFS	1.3960	sq. in.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

(J24091) 29 JAN 71

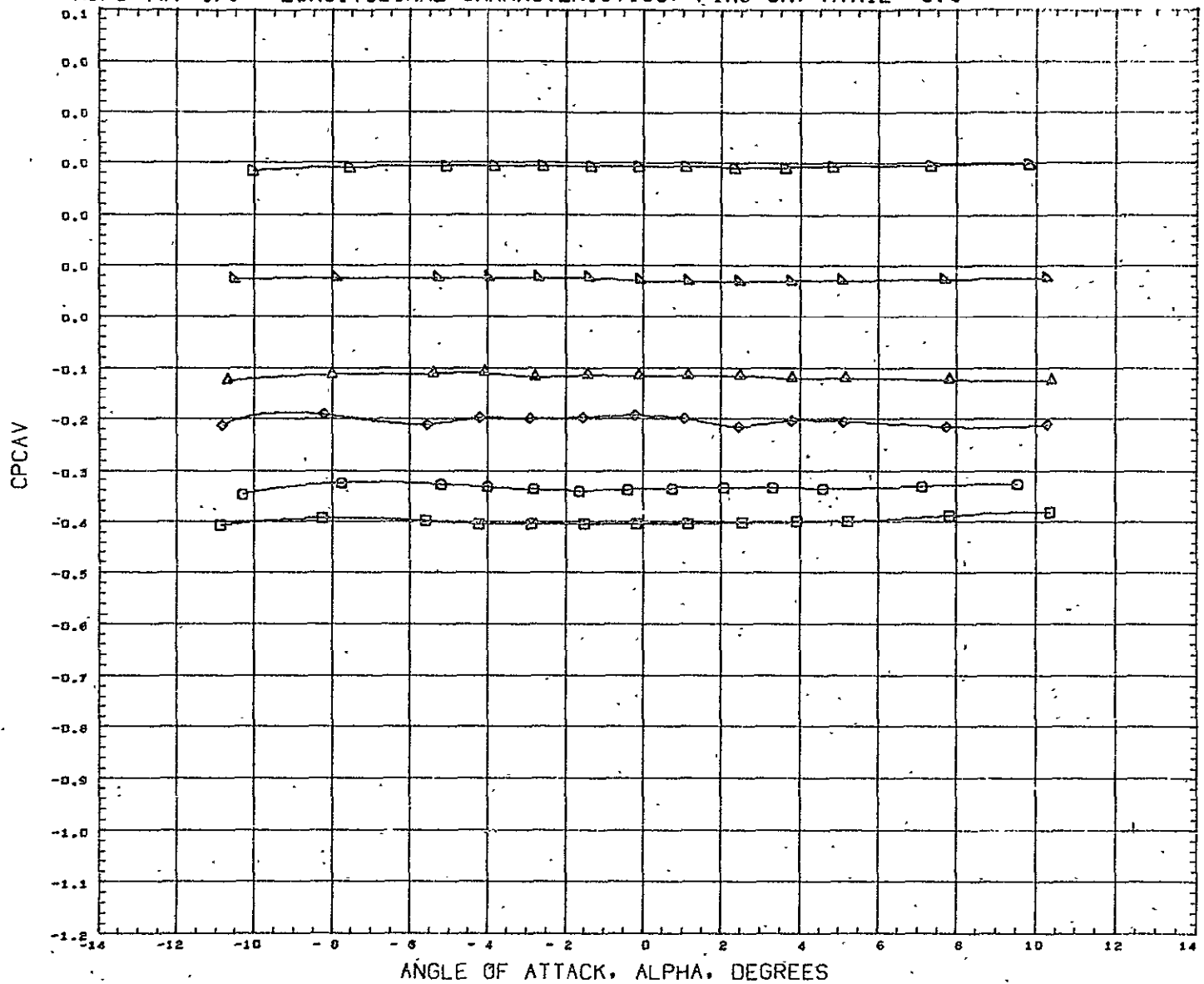
PAGE 100

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, HTAIL=-5.0



SYMBOL	NACH	PARAMETRIC VALUES				REFERENCE INFORMATION		
□	0.893	BETA	- 0.020	ORBINC	- 1.050	REFS	1.3960	SQ.IN.
□	0.995	WNGINC	4.000	HTAIL	- 5.000	REFL	1.3330	INCHES
◇	1.093	PHIB	0.000			REFB	1.3330	INCHES
△	1.190					XHRP	5.2640	INCHES
△	1.454					YNRP	0.0000	INCHES
◇	1.901	DATA HIST. CODE	0A			ZHRP	0.0000	INCHES
						SCALE	0.3366	PERCENT

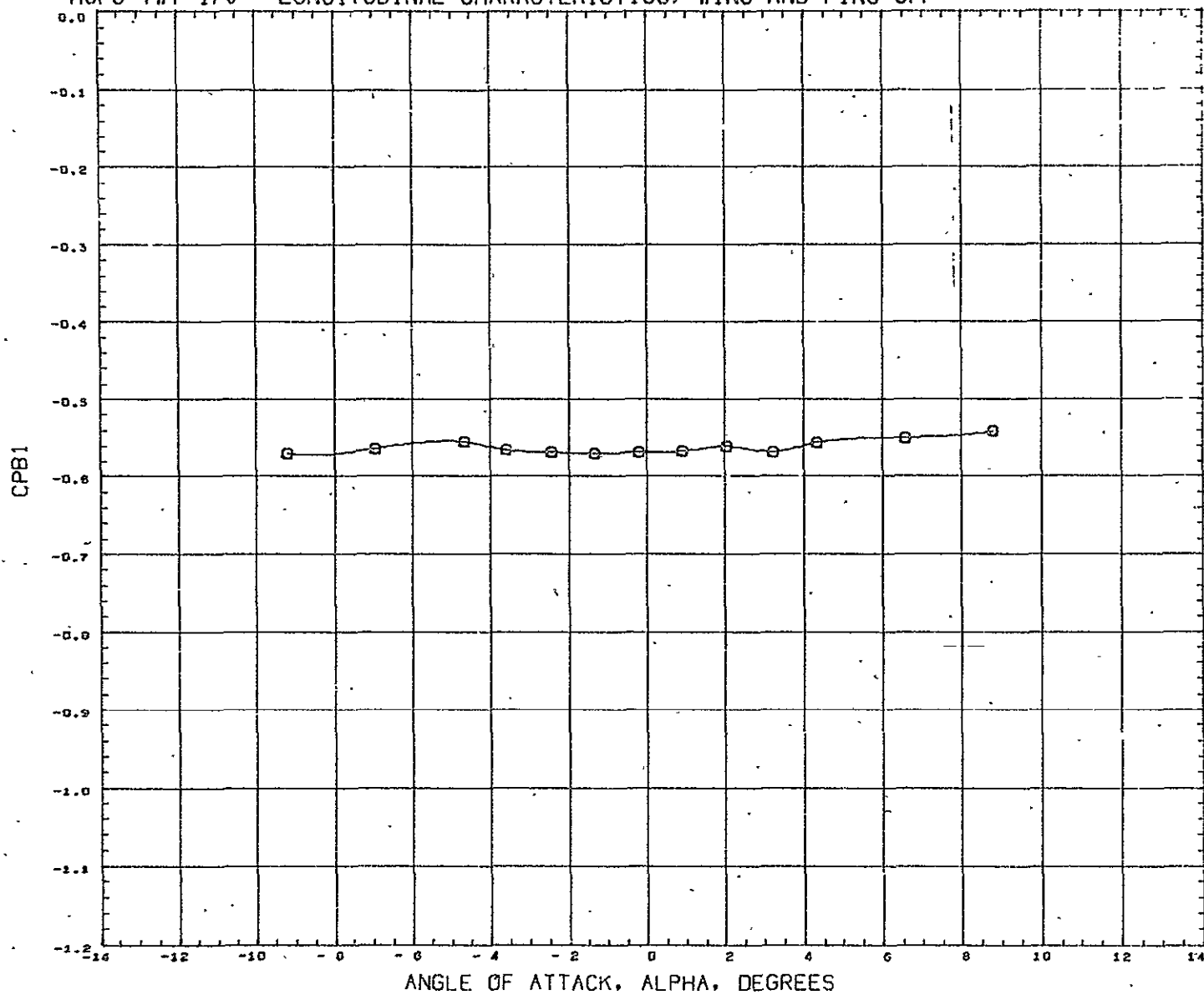
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, FINS ON, HTAIL=-5.0



SYMBOL	MACH	PARAMETRIC VALUES			
□	0.893	BETA	- 0.020	ORBITC	- 1.050
□	0.993	WINGINC	4.000	HTAIL	- 5.000
◇	1.093	PHIB	0.000		
△	1.199				
△	1.454				
□	1.961	DATA HIST. CODE - *A			

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS; WING AND FINS OFF

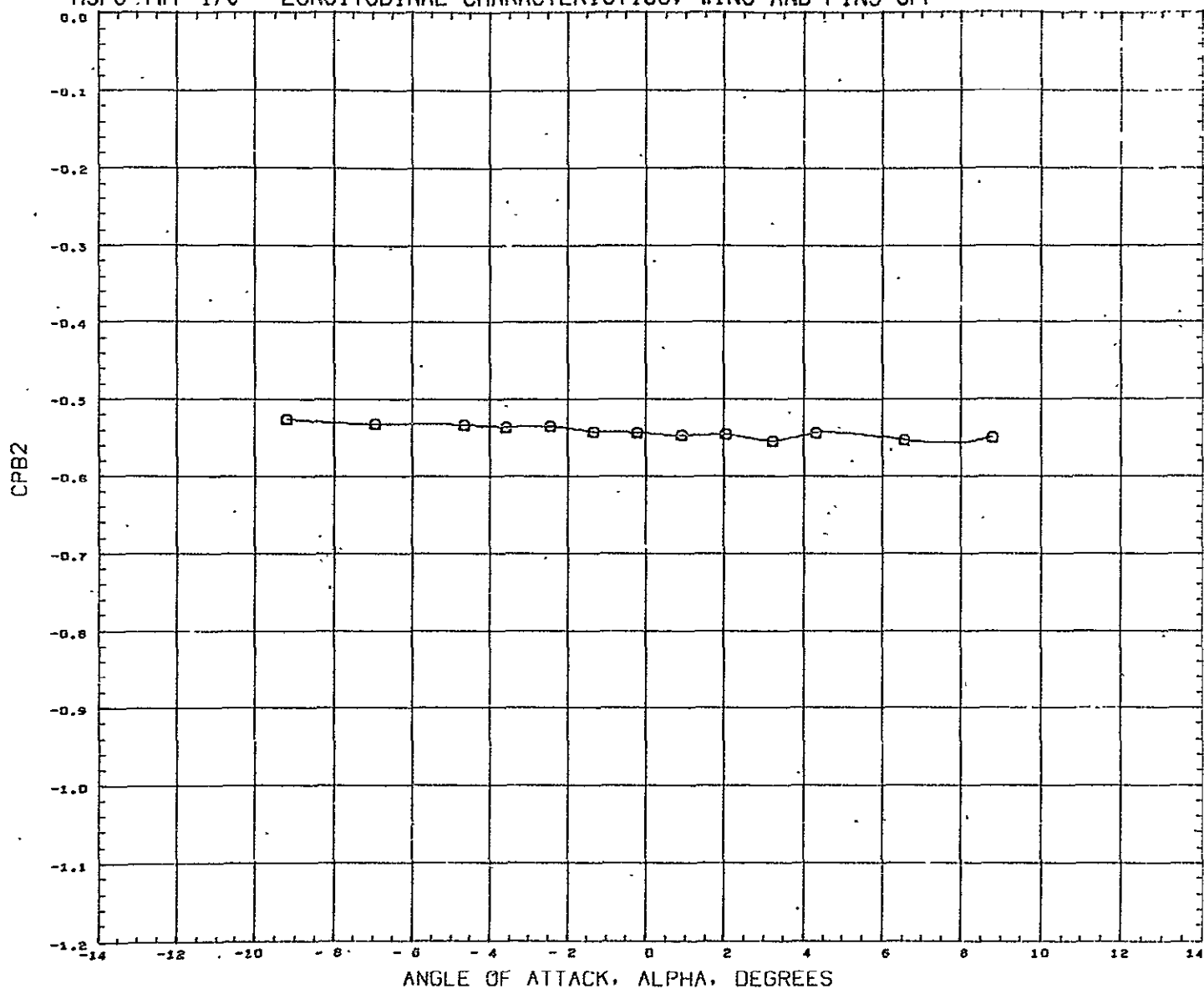


YMBOL	NACH	PARAMETRIC VALUES			
Q	0.995	BETA	- 0.100	ORBINC	- 1.050
		HTAIL	0.000	PHIB	0.000

REFERENCE INFORMATION		
REFS	1.3960	50. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3396	PERCENT

REFERENCE FILE

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING AND FINS OFF

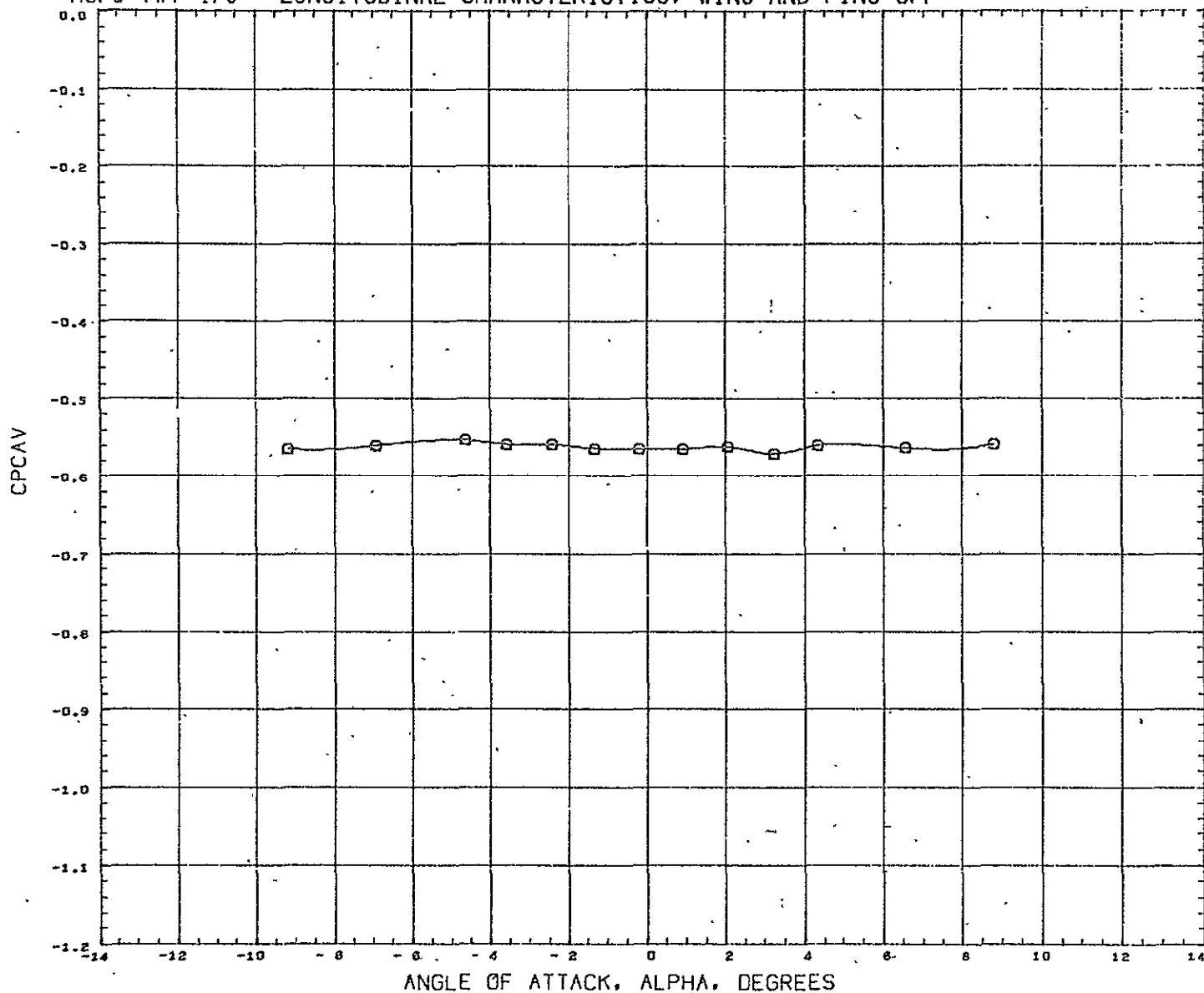


SYMBOL	NACH	PARAMETRIC VALUES			
Q	0.995	BETA -	0.100	ORBINC -	1.050
		MTAIL	0.000	PHIB	0.000

REFERENCE INFORMATION		
REFS	1.3960	SO.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3368	PERCENT

REFERENCE FILE

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING AND FINS OFF



SYMBOL MACH
 O 0.995
 BETA - 0.100
 HTAIL 0.000
 ORBINC - 1.050
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XNRP 5.2640 INCHES
 YNRP 0.0000 INCHES
 ZNRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

REFERENCE FILE

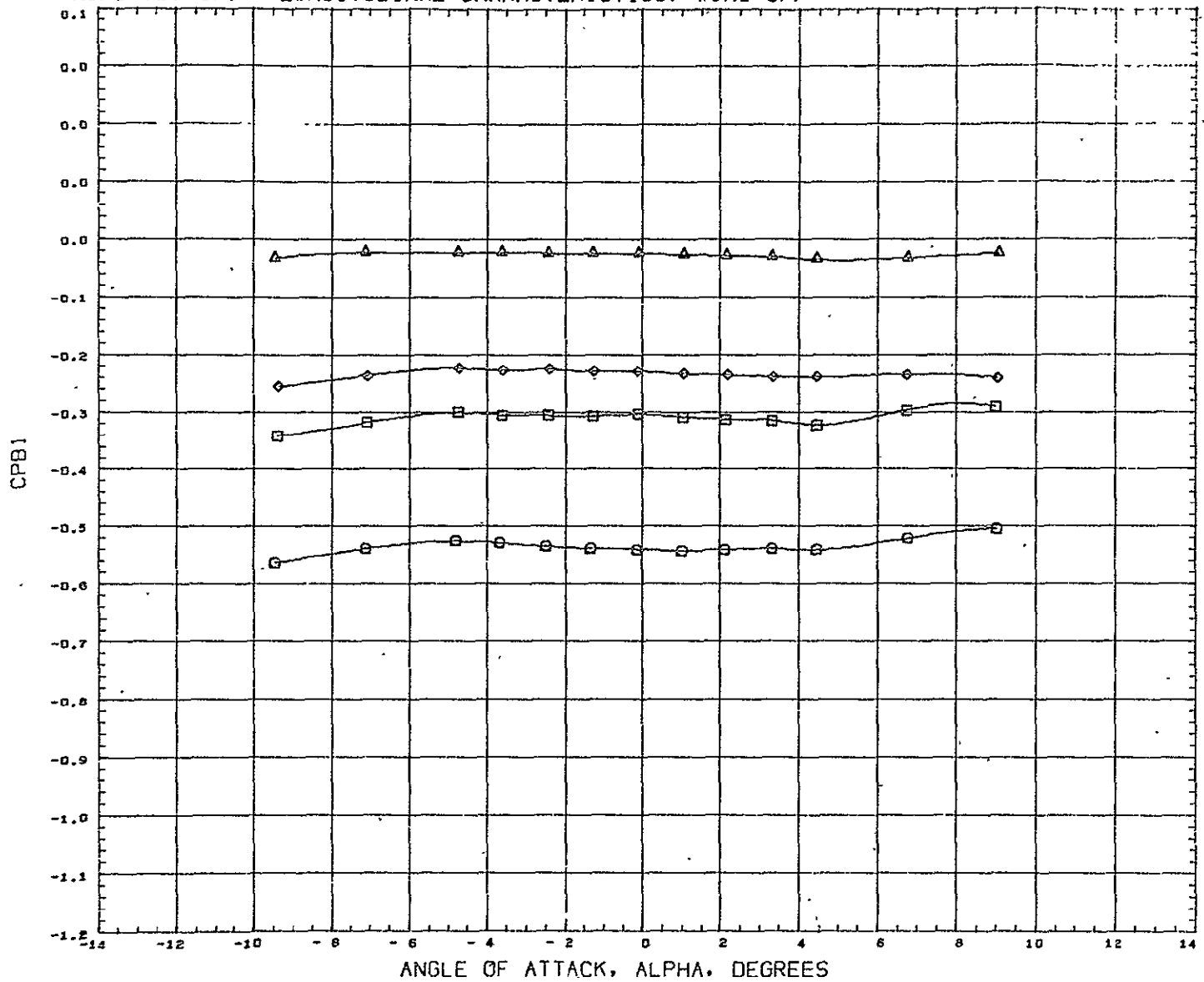
TWT470 S-IC/GAC ORBITER B0HVS

WING, FINS OFF (A24101)

26 JAN 71

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING OFF



PARAMETRIC VALUES																									
<table border="0"> <tr> <td>○</td> <td>0.999</td> <td>BETA</td> <td>- 0.100</td> <td>ORBINC</td> <td>- 1.050</td> </tr> <tr> <td>□</td> <td>1.102</td> <td>HTAIL</td> <td>0.000</td> <td>PHIB</td> <td>0.000</td> </tr> <tr> <td>◇</td> <td>1.195</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>△</td> <td>1.459</td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	○	0.999	BETA	- 0.100	ORBINC	- 1.050	□	1.102	HTAIL	0.000	PHIB	0.000	◇	1.195					△	1.459					
○	0.999	BETA	- 0.100	ORBINC	- 1.050																				
□	1.102	HTAIL	0.000	PHIB	0.000																				
◇	1.195																								
△	1.459																								

REFERENCE FILE

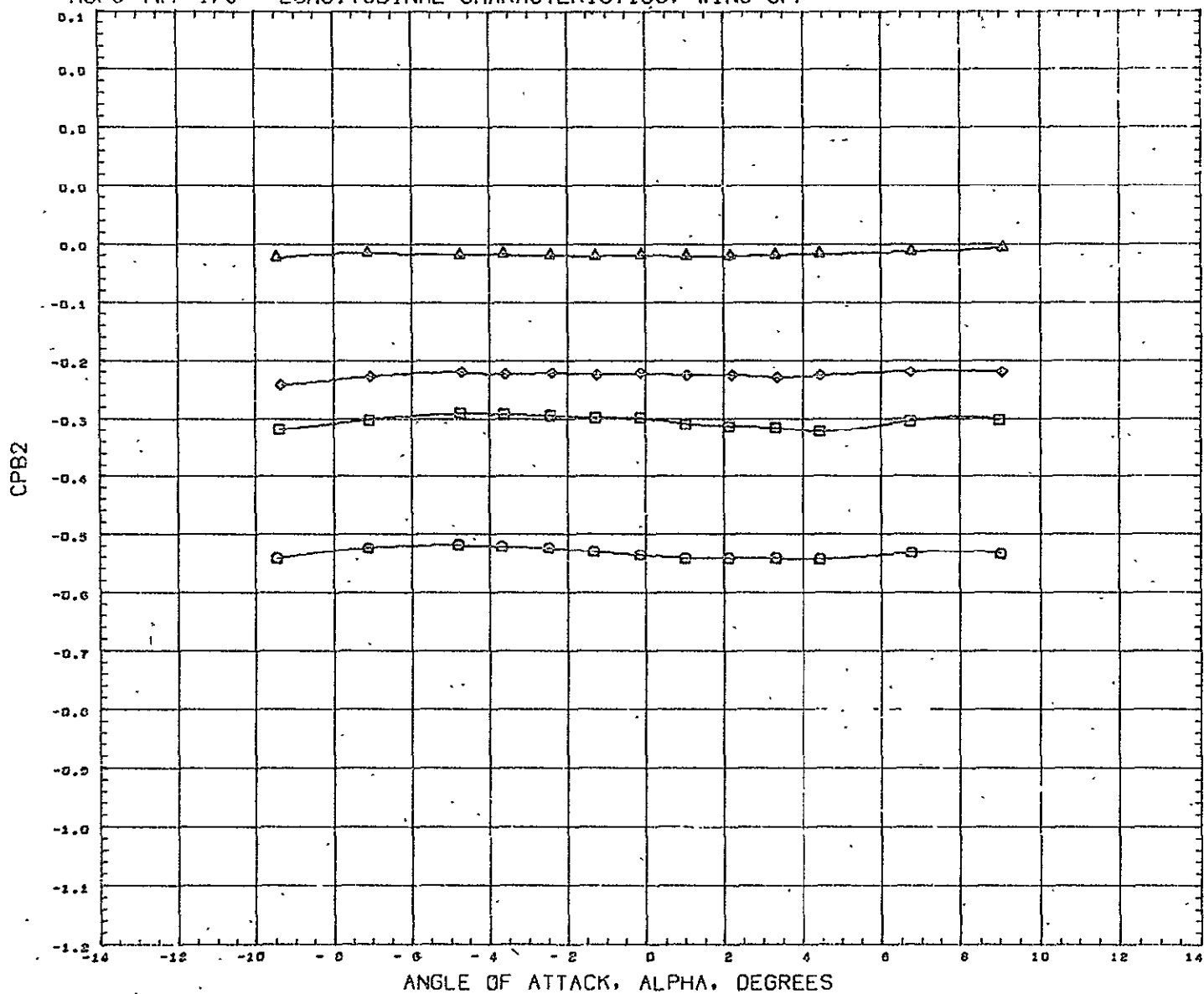
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REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

WT470 S-IC/GAC ORBITER BF10HVS WING OFF

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING OFF

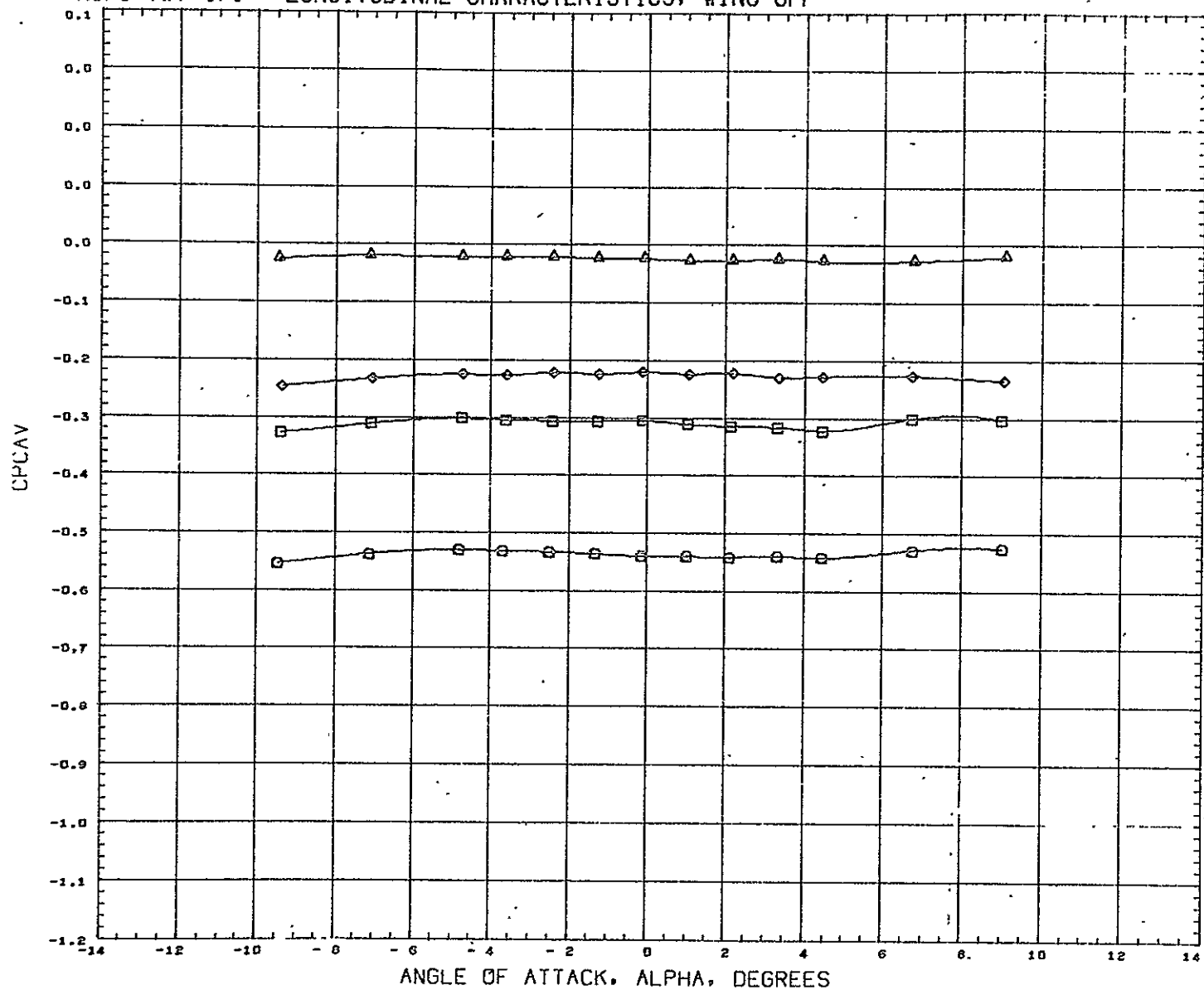


SYMBOL	MACH	PARAMETRIC VALUES
□	0.999	BETA4 - 0.100 ORBINC - 1.050
□	1.102	HTAIL 0.000 PHIB 0.000
◇	1.195	
△	1.459	

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	50. IN.
REFL	1.3130	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING OFF



1BOL MACH
 0 0.999 BETA - 0.100 ORBINC - 1.030
 0 1.102 HTAIL 0.000 PHIB 0.000
 0 1.195
 1 1.459

REFERENCE FILE

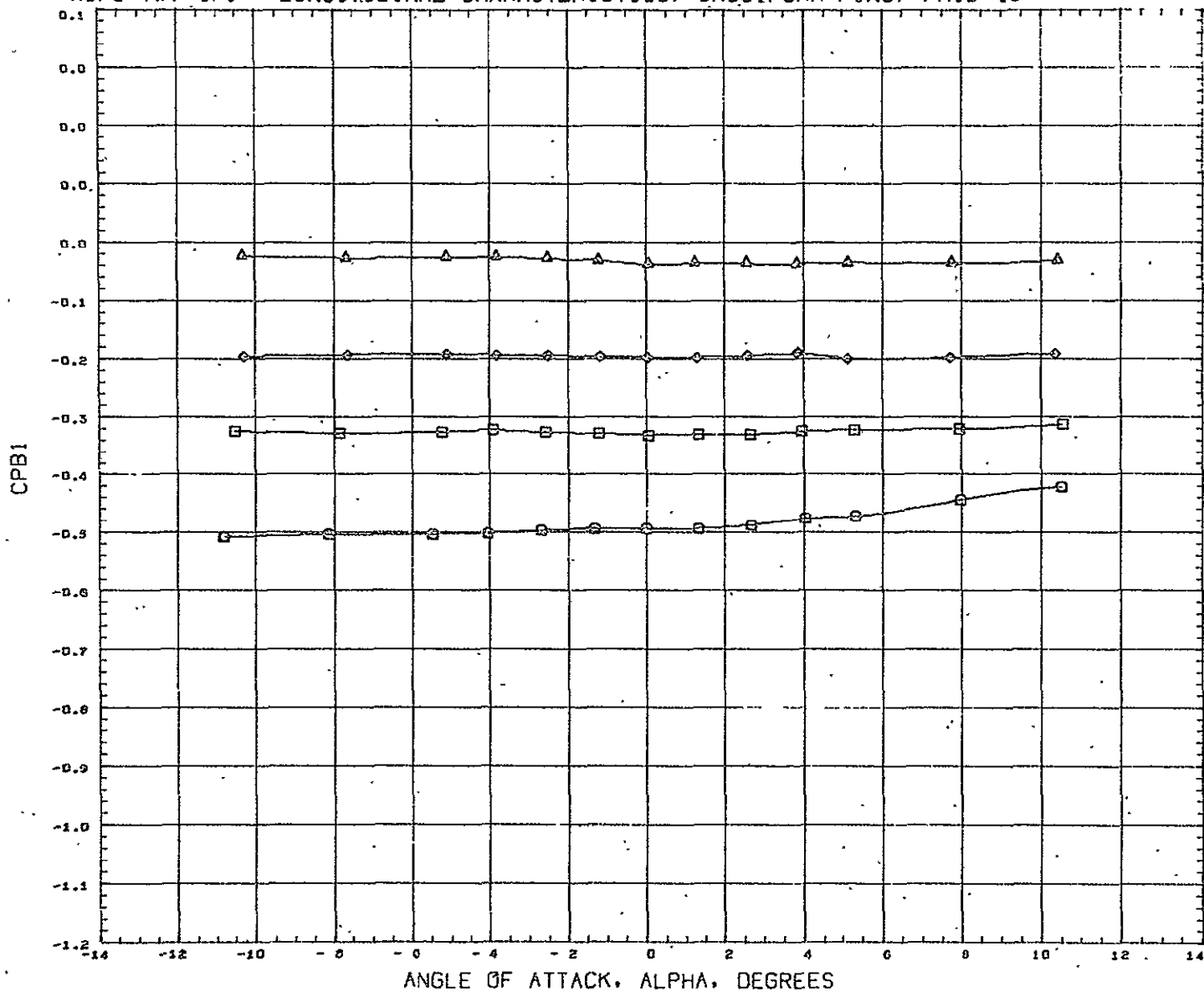
REFERENCE INFORMATION
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 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XHRF 5.2640 INCHES
 YHRF 0.0000 INCHES
 ZHRF 0.0000 INCHES
 SCALE 0.3366 PERCENT

MT470 S-IC/GAC ORBITER BF10HVS WING OFF

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=45

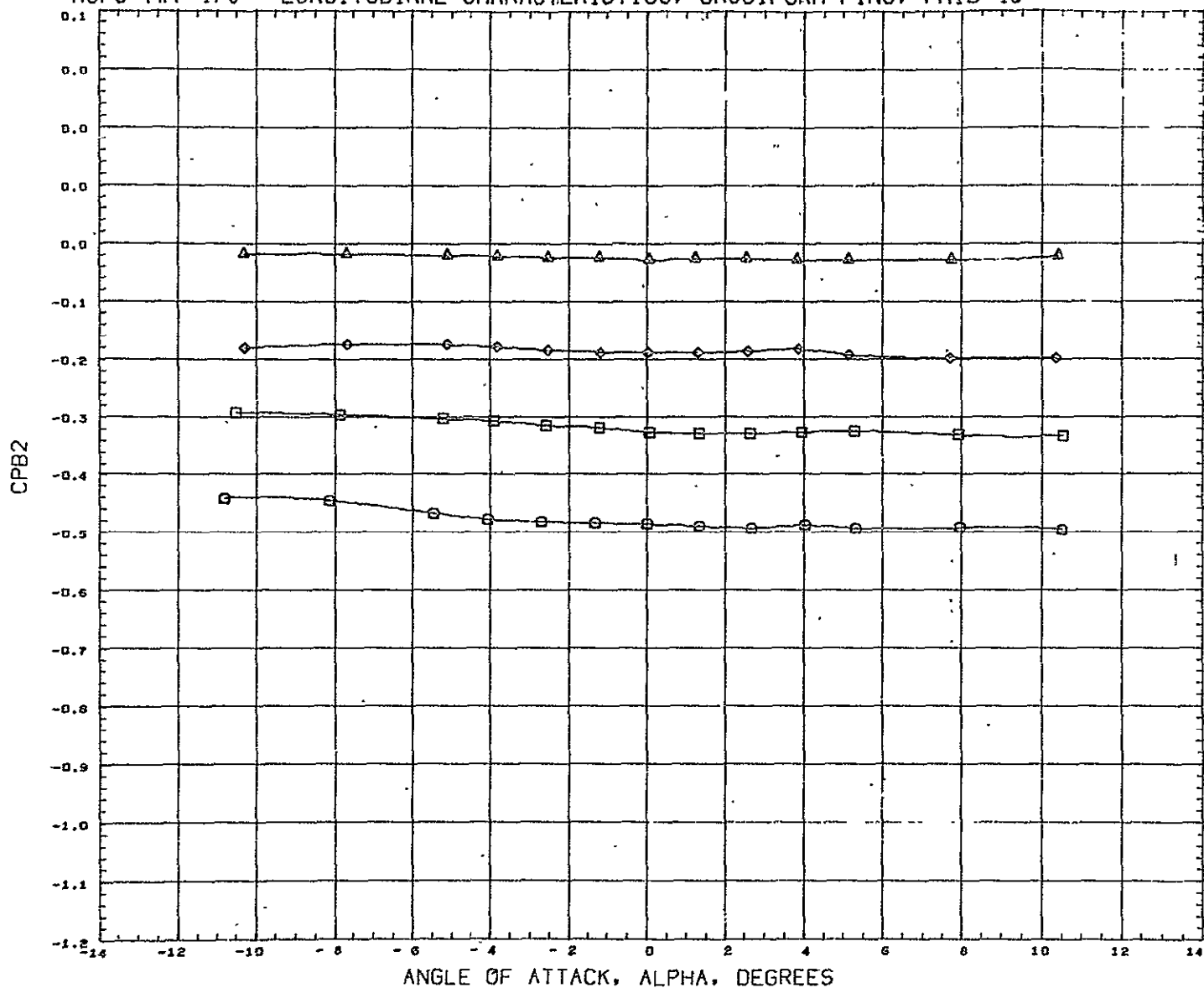


SYMBOL	MACH	PARAMETRIC VALUES			
□	1.006	BETA	- 0.070	ORBINC	- 1.050
□	1.193	WNGINC	4.000	HTAIL	0.000
◇	1.303	PHIB	45.000		
△	1.463				

REFERENCE INFORMATION		
REFS	1.3960	SQ.IN.
REFL	1.3330	INCHES
REFB	1.1130	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=45

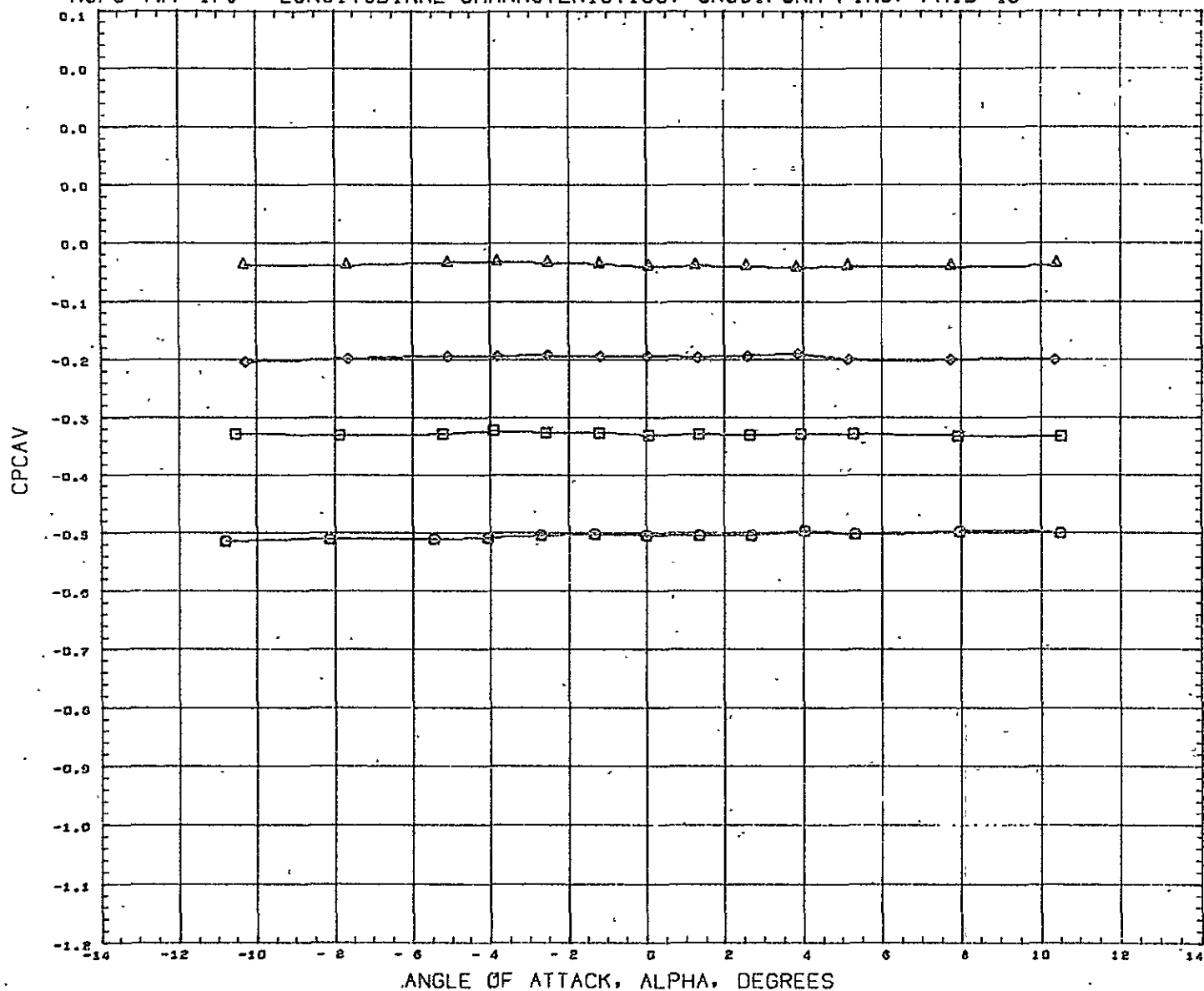


YMBOL	MACH	PARAMETRIC VALUES			
○	1.006	BETA	- 0.070	ORBINC	- 1.050
□	1.195	WNGINC	4.000	NTAIL	0.000
◇	1.303	PHIB	45.000		
△	1.463				

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=45

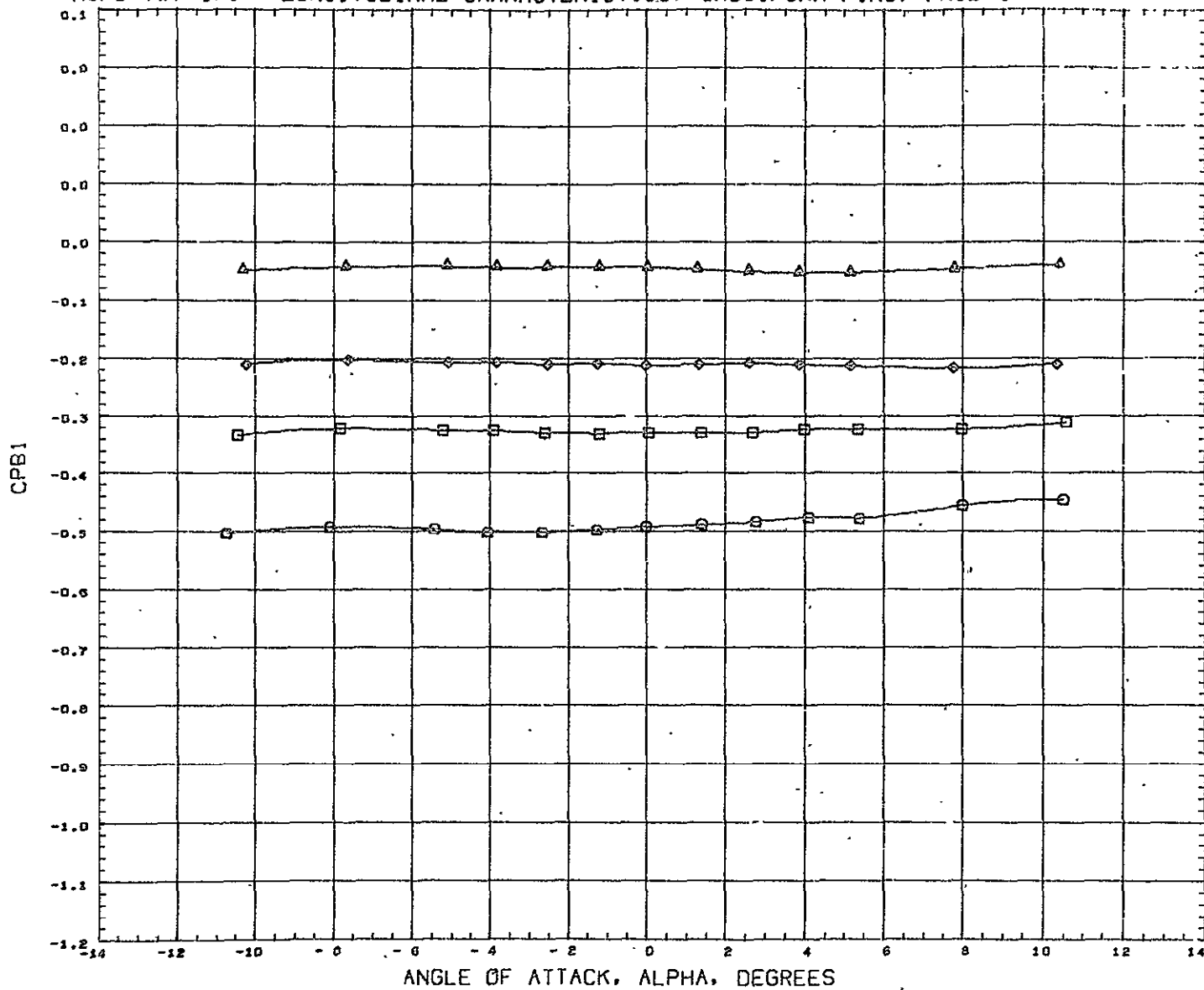


YMBOL	MACH	PARAMETRIC VALUES			
○	1.006	BETA	- 0.070	ORBINC	- 1.030
□	1.195	WINGINC	4.000	HTAIL	0.000
◇	1.303	PHIB	45.000		
△	1.463				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=0



YNBOL	MACH	PARAMETRIC VALUES			
○	0.997	BETA	- 0.060	ORBINC	- 1.050
□	1.198	WNGINC	4.000	HTAIL	0.000
◇	1.303	PHIB	0.000		
△	1.459				

REFERENCE FILE

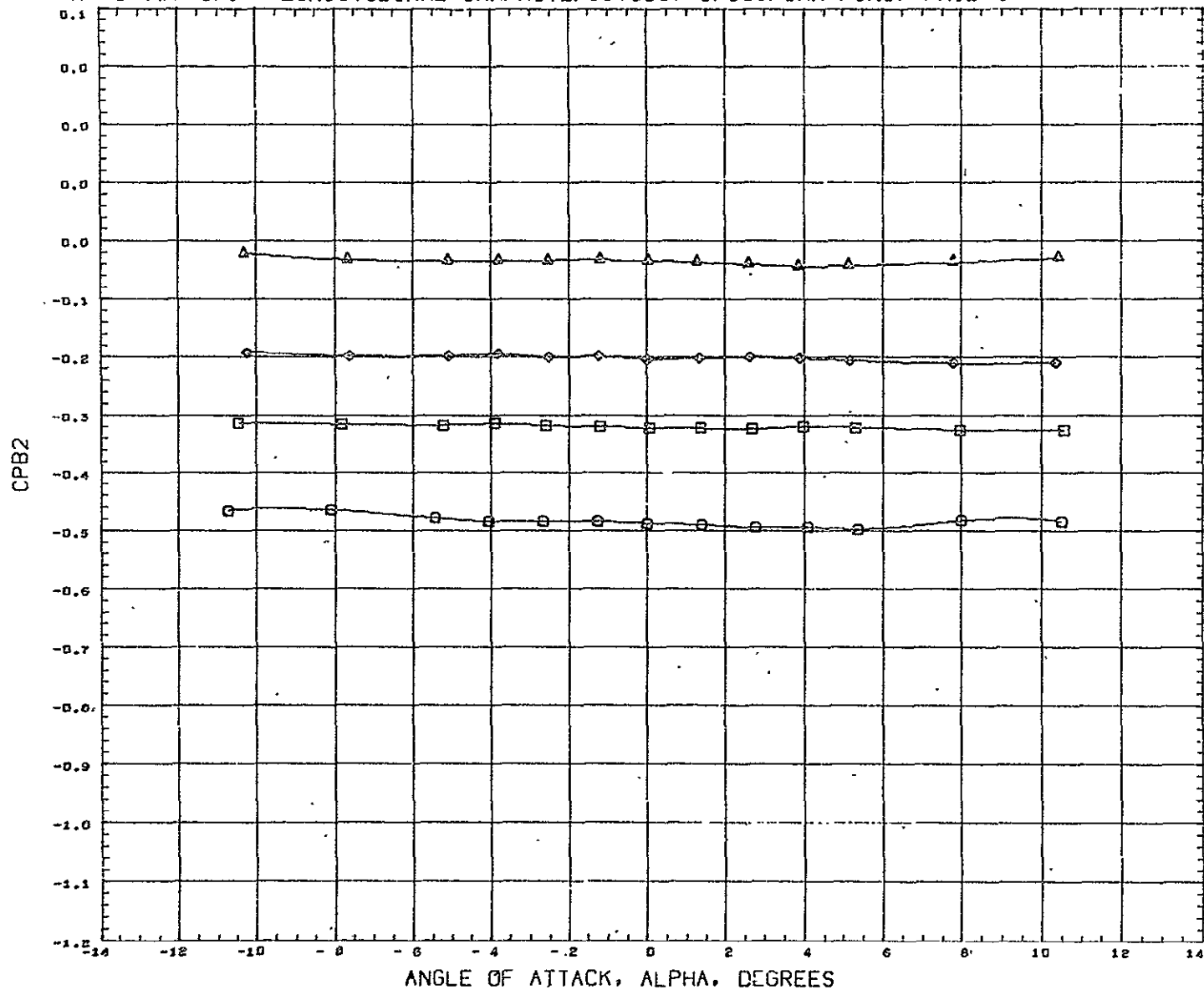
REFERENCE INFORMATION		
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REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

WT470 S-IC/GAC ORBITER BF20WHVS. PHIB = 0

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=0

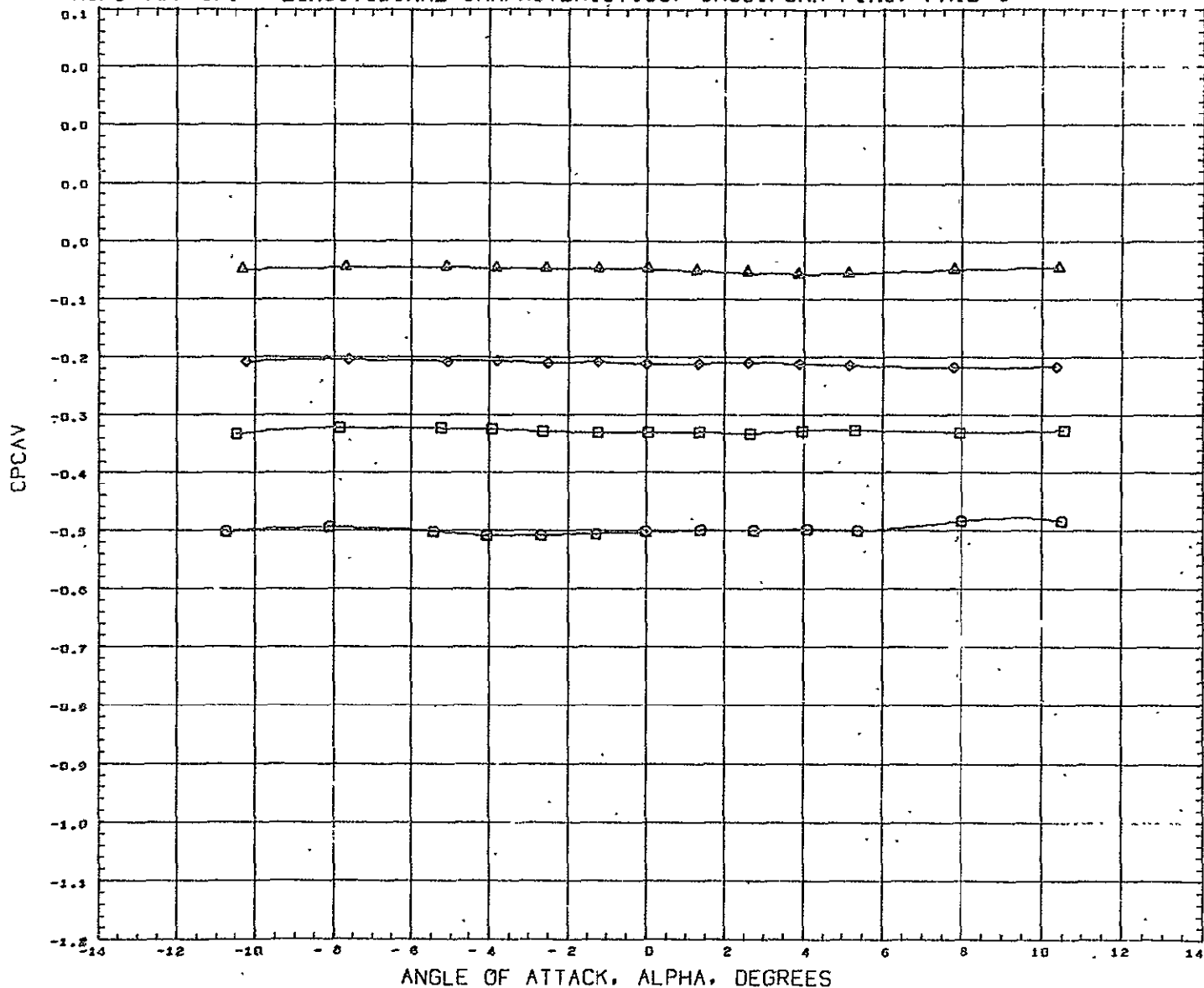


SYMBOL	MACH	PARAMETRIC VALUES			
○	0.997	BETA	- 0.060	ORBINC	- 1.050
□	1.198	WNGINC	4.000	HTAIL	0.000
◇	1.303	PHIB	0.000		
△	1.459				

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=0



MSOL. MACH. PARAMETRIC VALUES
 O 0.997 BETA - 0.060 ORBINC - 1.050
 □ 1.198 WINGINC 4.000 HTAIL 0.000
 ◇ 1.303 PHIB 0.000
 △ 1.459

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
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 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

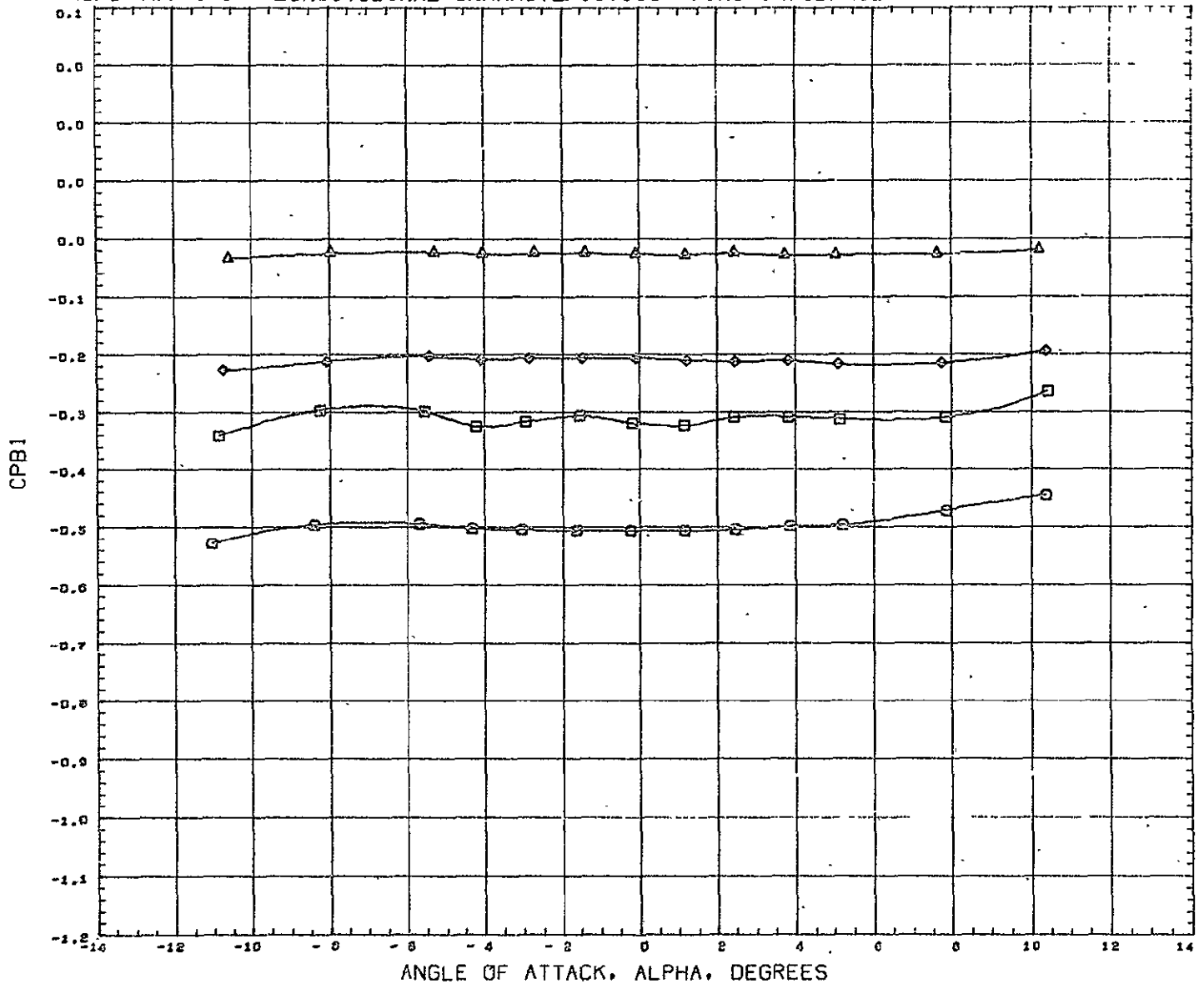
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WT470 S-IC/GAC ORBITER BF20WHVS. PHIB = 0

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING INCIDENCE = 2.0

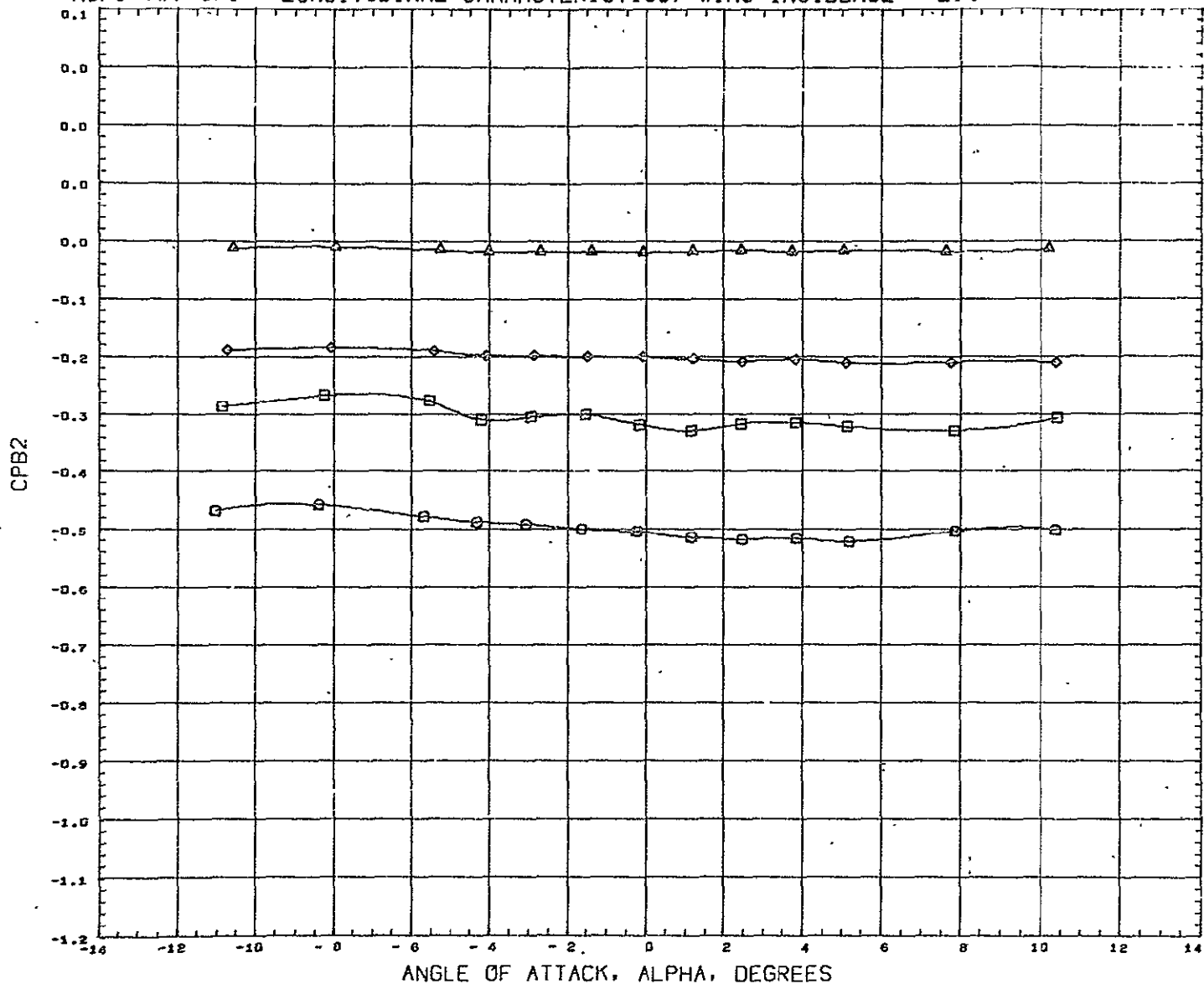


SYMBOL	MACH	PARAMETRIC VALUES			
□	1.001	BETA	- 0.000	ORBINC	- 1.050
□	1.091	WINGINC	2.000	HTAIL	0.000
◇	1.202	PHID	0.000		
△	1.456				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SO.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING INCIDENCE = 2.0

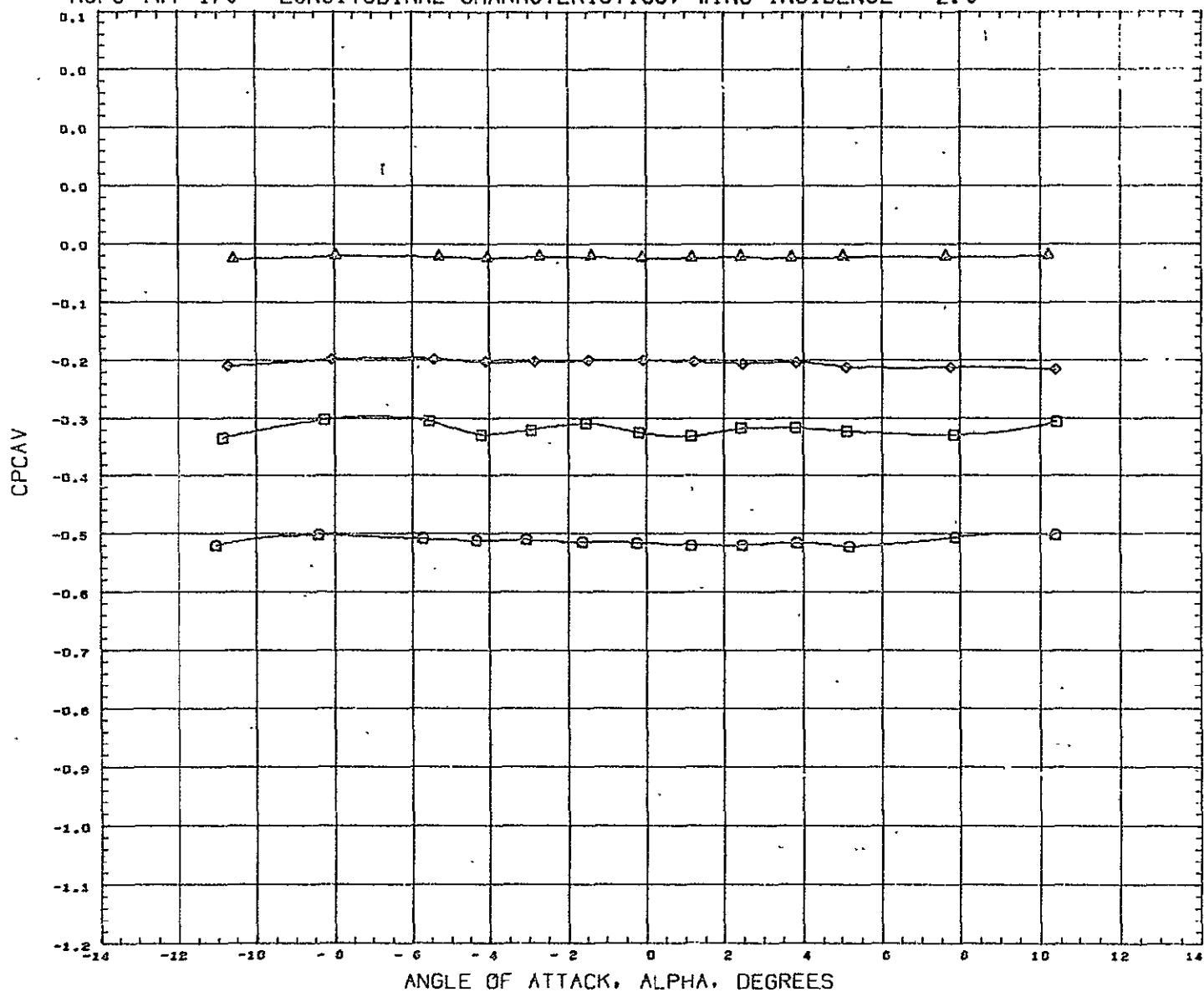


SYMBOL	MACH	PARAMETRIC VALUES			
○	1.001	BETA	- 0.090	ORBNIC	- 1.050
□	1.091	WINGINC	2.000	HTAIL	0.000
◇	1.202	FHIB	0.000		
△	1.456				

REFERENCE INFORMATION		
REFS	1.3960	SQ.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING INCIDENCE = 2.0

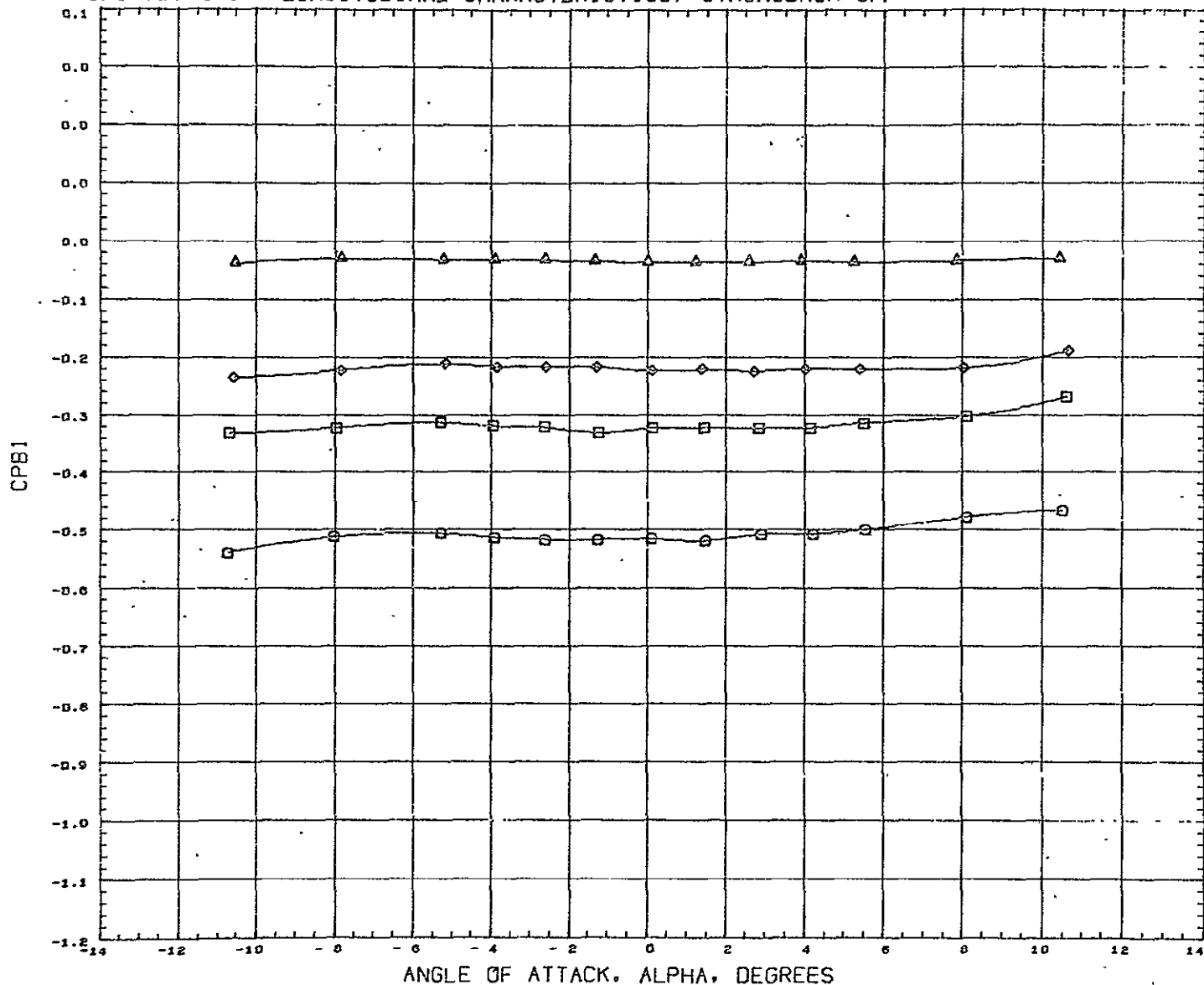


SYMBOL		MACH		PARAMETRIC VALUES			
○	1.001	BETA	- 0.099	ORBINC	- 1.050		
□	1.091	WINGINC	2.000	HTAIL	0.000		
◇	1.202	PHIB	0.000				
△	1.436						

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, STRONGBACK OFF

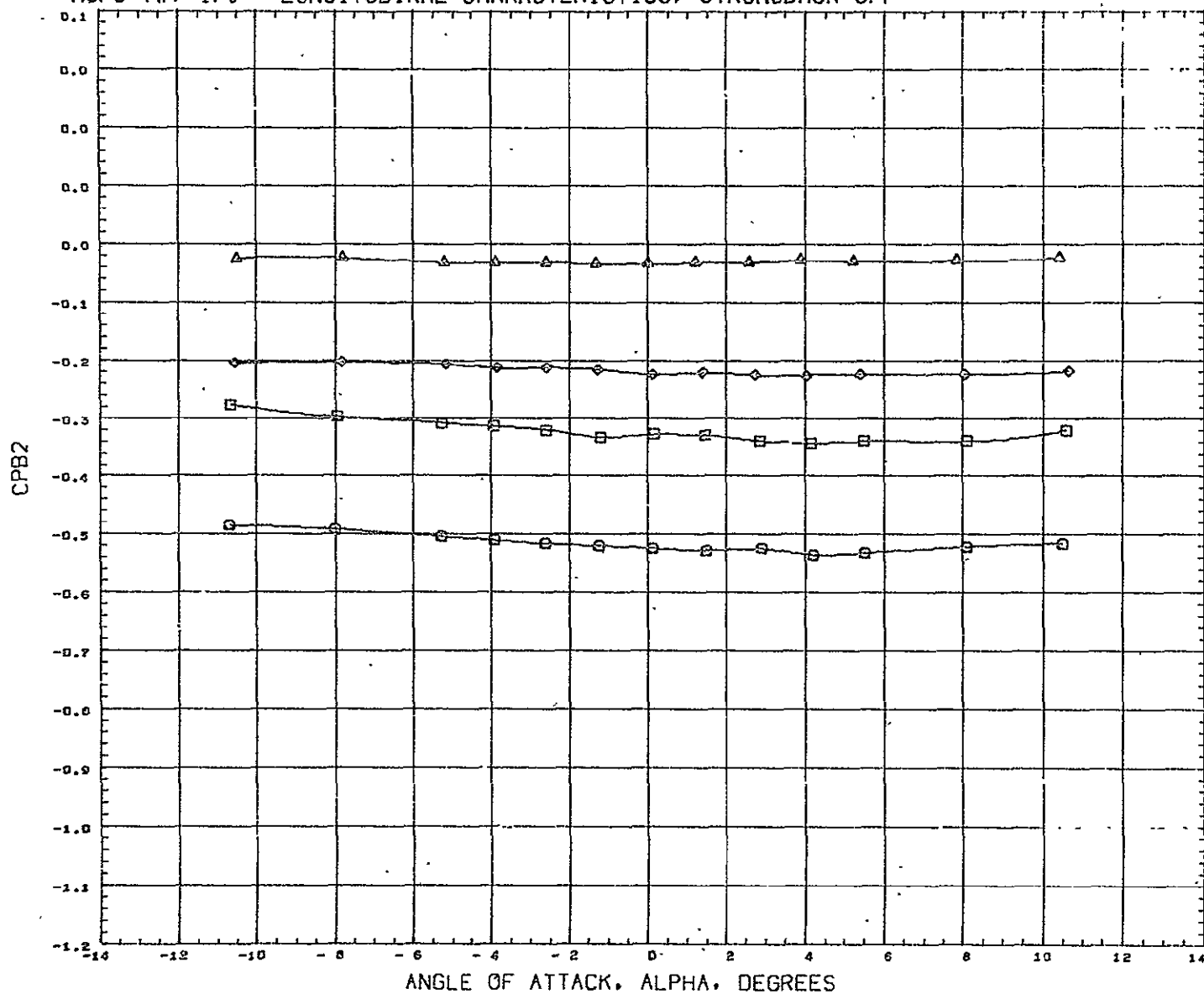


SYMBOL	MACH	PARAMETRIC VALUES			
□	1.002	BETA	- 0.040	ORBINC	- 1.050
□	1.099	WNGINC	4.000	NTAIL	0.000
◇	1.200	PHIB	0.000		
△	1.480				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3980	90. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

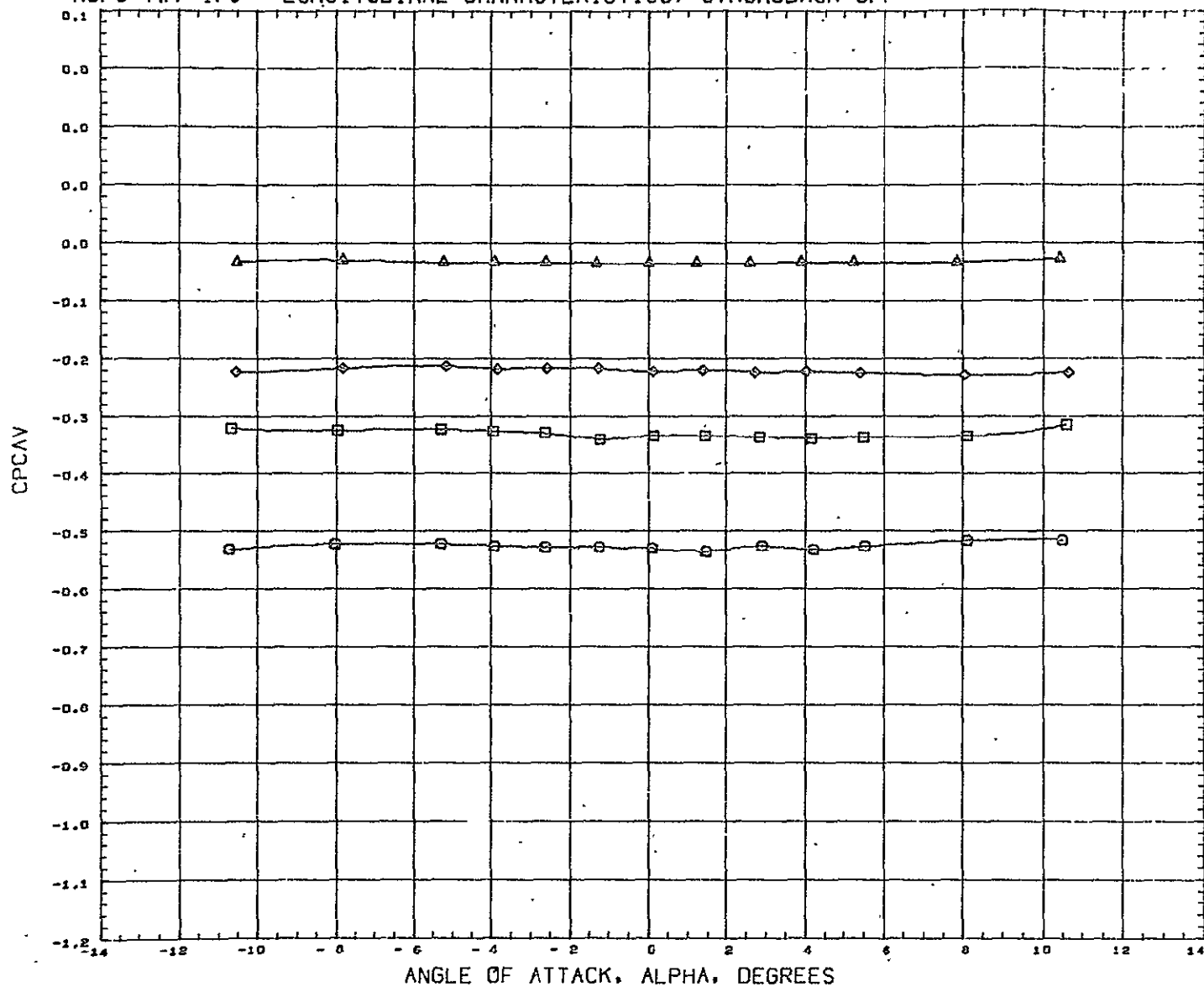
MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, STRONGBACK OFF



SYMBOL		PARAMETRIC VALUES				REFERENCE INFORMATION	
□	1.002	BETA	- 0.040	ORBINC	- 1.050	REFS	1.3960 SQ. IN.
□	1.099	WHGINC	4.000	HTAIL	0.000	REFL	1.3330 INCHES
◇	1.200	PHIB	0.000			REFB	1.3330 INCHES
△	1.400					XMRP	5.2640 INCHES
						YMRP	0.0000 INCHES
						ZMRP	0.0000 INCHES
						SCALE	0.3366 PERCENT

REFERENCE FILE

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, STRONGBACK OFF

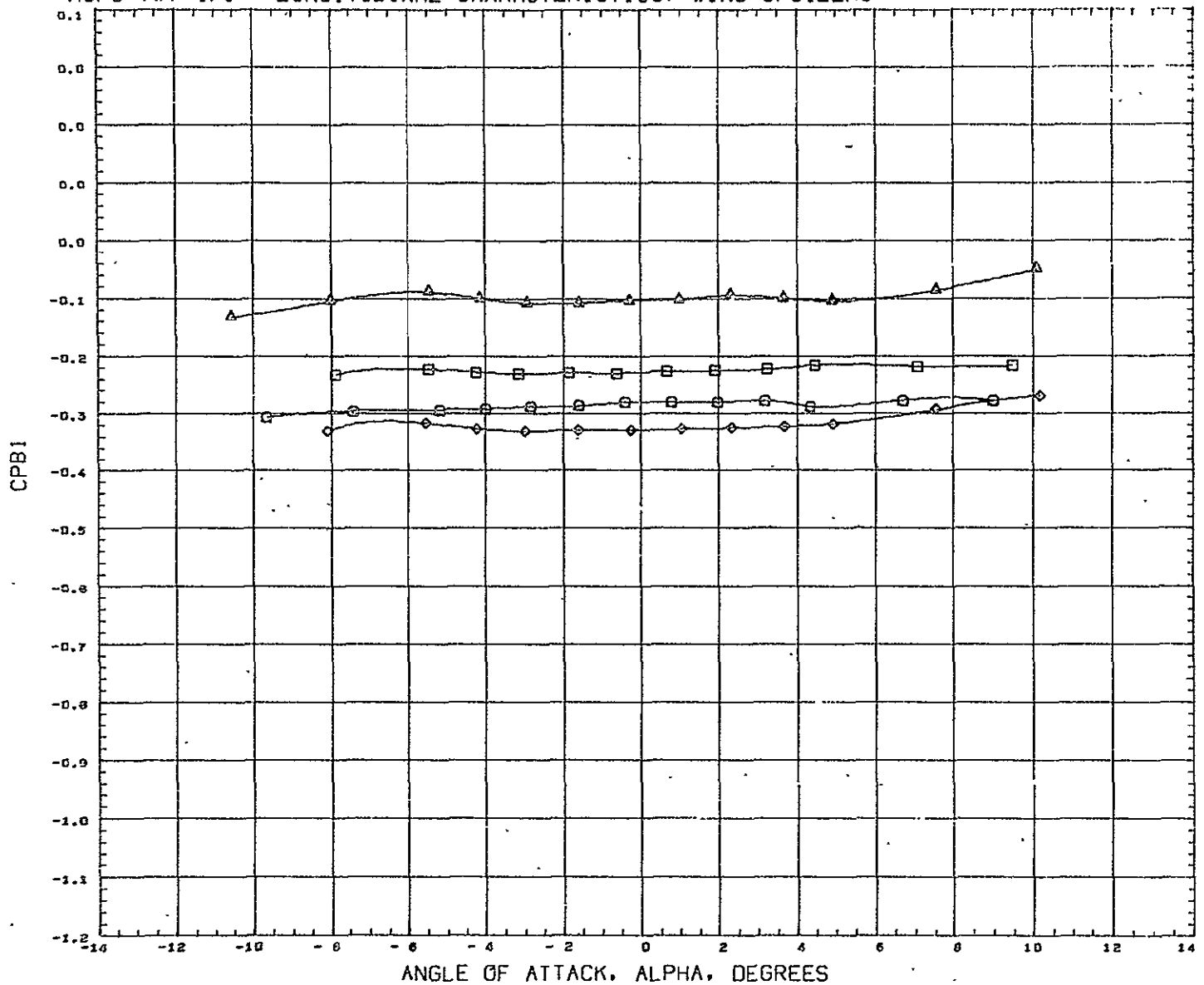


SYMBOL	MACH	PARAMETRIC VALUES			
□	1.002	BETA	- 0.040	ORBINC	- 1.050
◇	1.099	WINGINC	4.000	HTAIL	0.000
○	1.200	PHIB	0.000		
△	1.460				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	sq. in.
REFL	1.3330	inches
REFB	1.3330	inches
XMRP	5.2640	inches
YMRP	0.0000	inches
ZMRP	0.0000	inches
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING SPOILERS

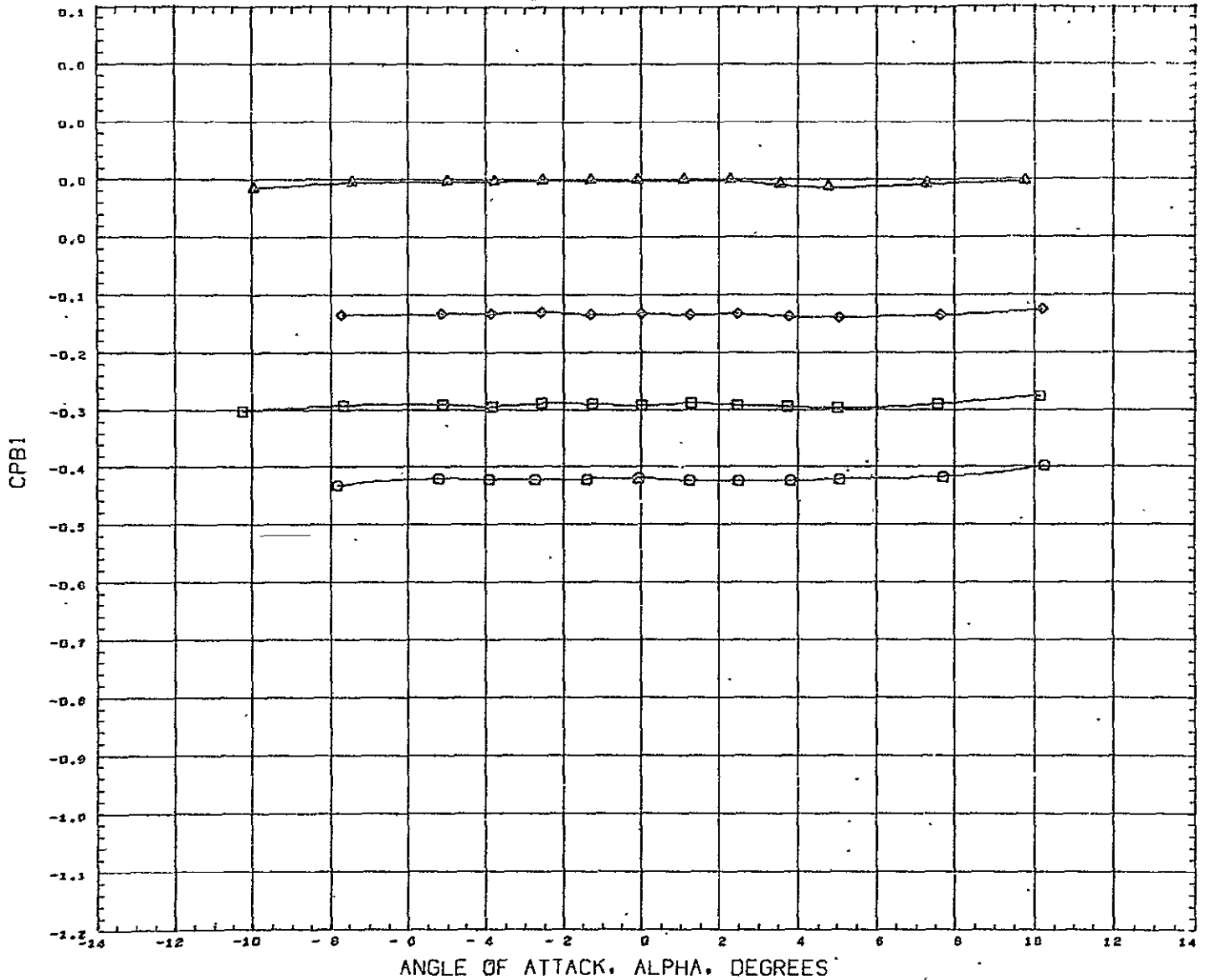


SYMBOL		MACH		PARAMETRIC VALUES			
○	0.599	BETA	- 0.050	ORBINC	- 1.050		
□	0.904	WINGINC	4.000	HTAIL	0.000		
◇	0.998	PHIB	0.000				
△	1.159						

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING SPOILERS

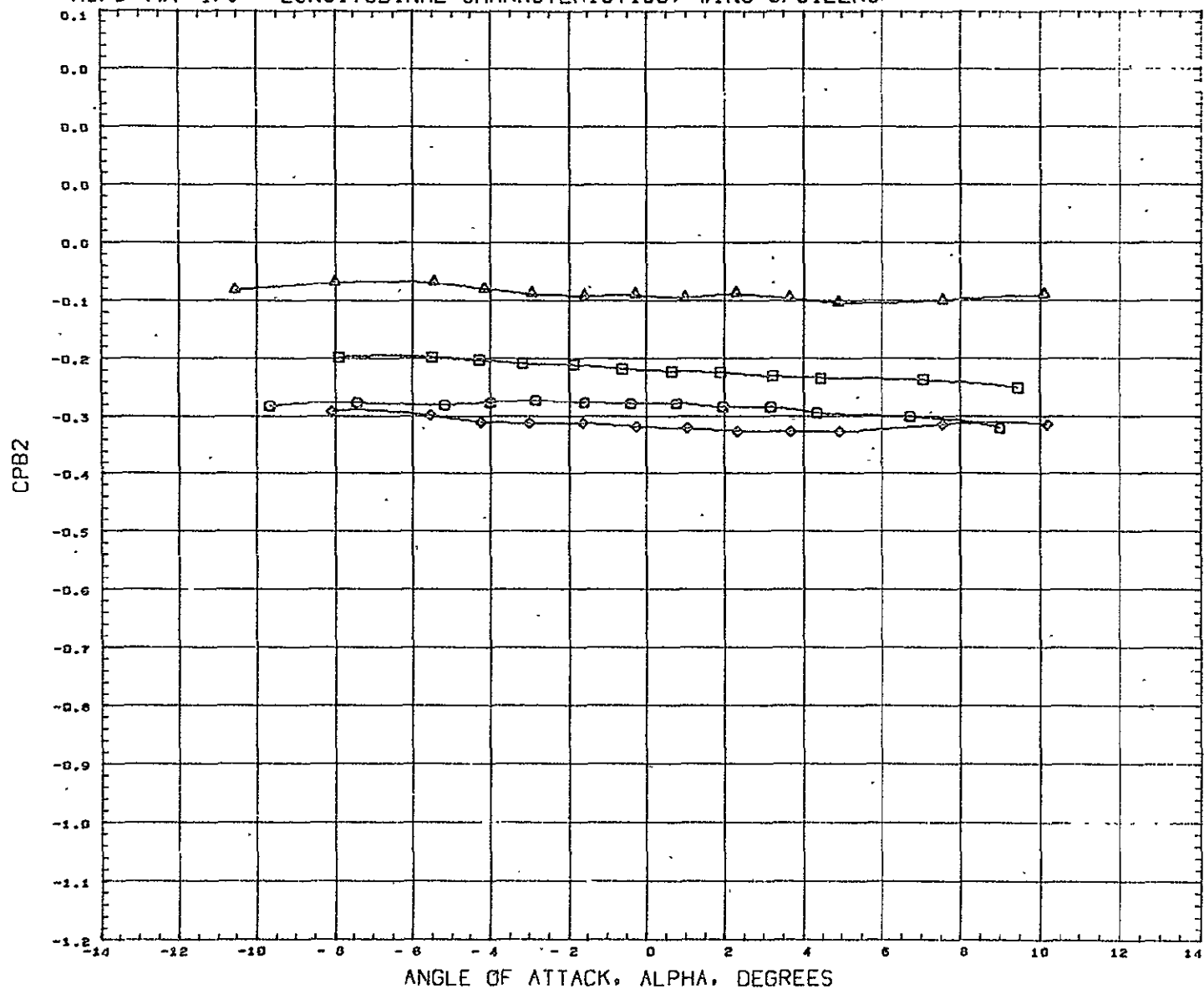


SYMBOL	MACH	PARAMETRIC VALUES			
○	1.200	BETA	- 0.050	ORBINC	- 1.050
□	1.302	WINGINC	4.000	HTAIL	0.000
◇	1.457	PHIB	0.000		
△	1.968				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	59. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING SPOILERS

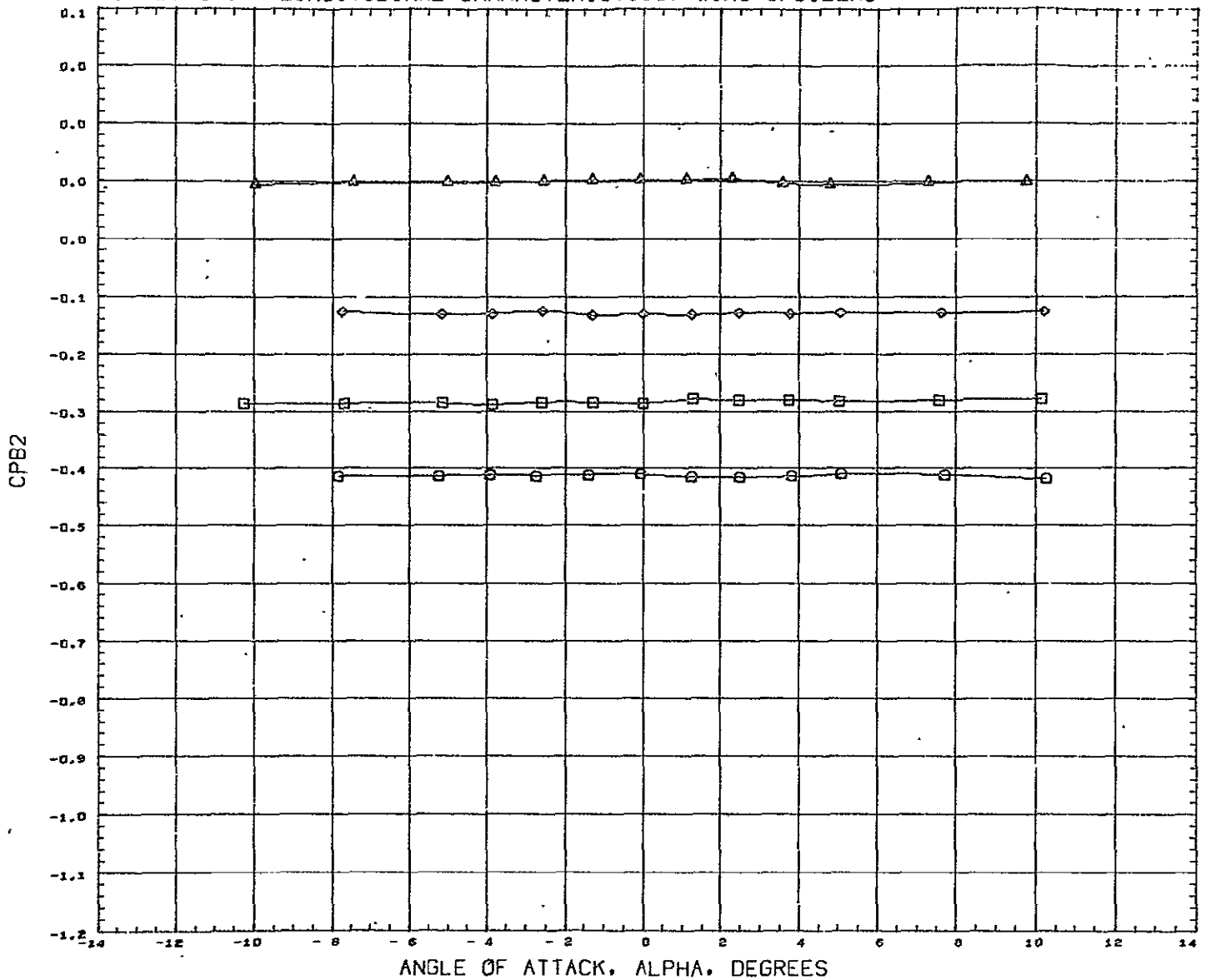


SYMBOL	MACH	BETA	PARAMETRIC VALUES	ORBITAL	HTAIL
○	0.599	-0.050	ORBITAL	-1.050	
□	0.904	WINGINC	4.000	HTAIL	0.000
◇	0.998	PHIB	0.000		
△	1.100				

REFERENCE INFORMATION		
REFS	1.3960	SG. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING SPOILERS

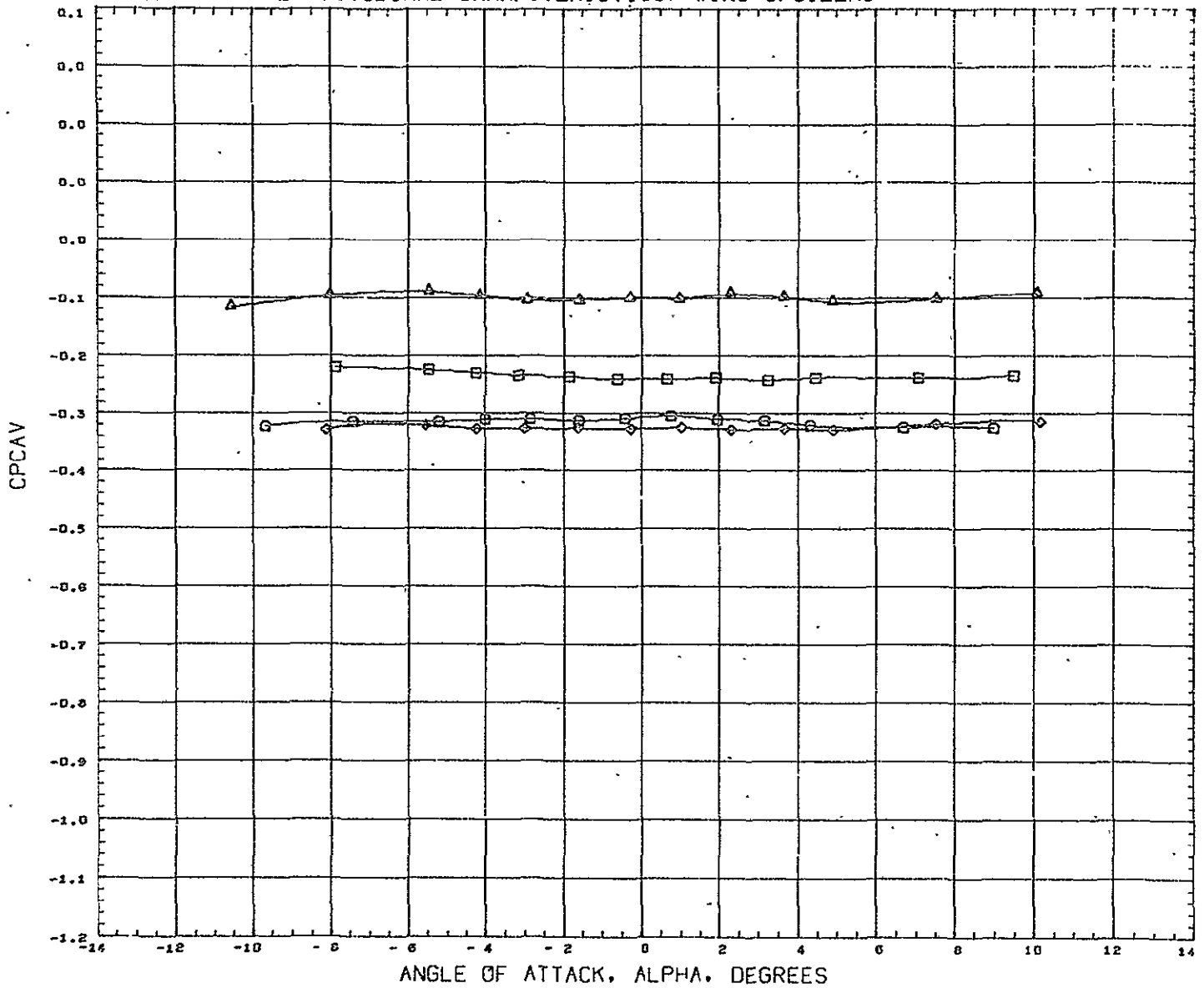


SYMBOL	MACH	PARAMETRIC VALUES			
○	1.200	BETA	- 0.050	ORBINC	- 1.050
□	1.302	WNGINC	4.000	HTAIL	0.000
◇	1.457	PHIB	0.000		
Δ	1.968				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	60. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC IWI 470 LONGITUDINAL CHARACTERISTICS, WING SPOILERS

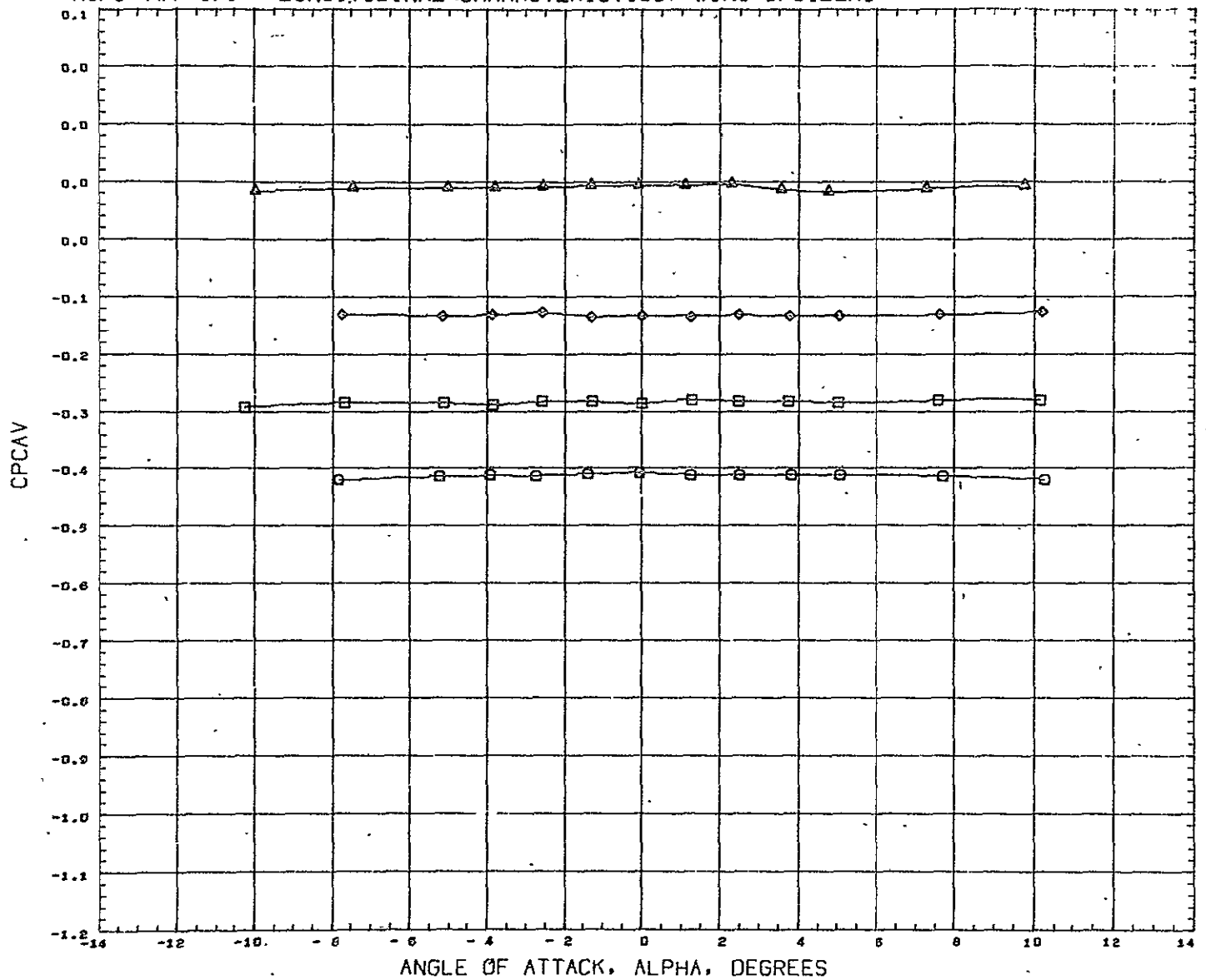


SYMBOL	MACH	PARAMETRIC VALUES			
□	0.599	BETA	- 0.050	ORBINC	- 1.050
□	0.904	WNGINC	4.000	HTAIL	0.000
◇	0.998	PHIB	0.000		
Δ	1.100				

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS, WING SPOILERS

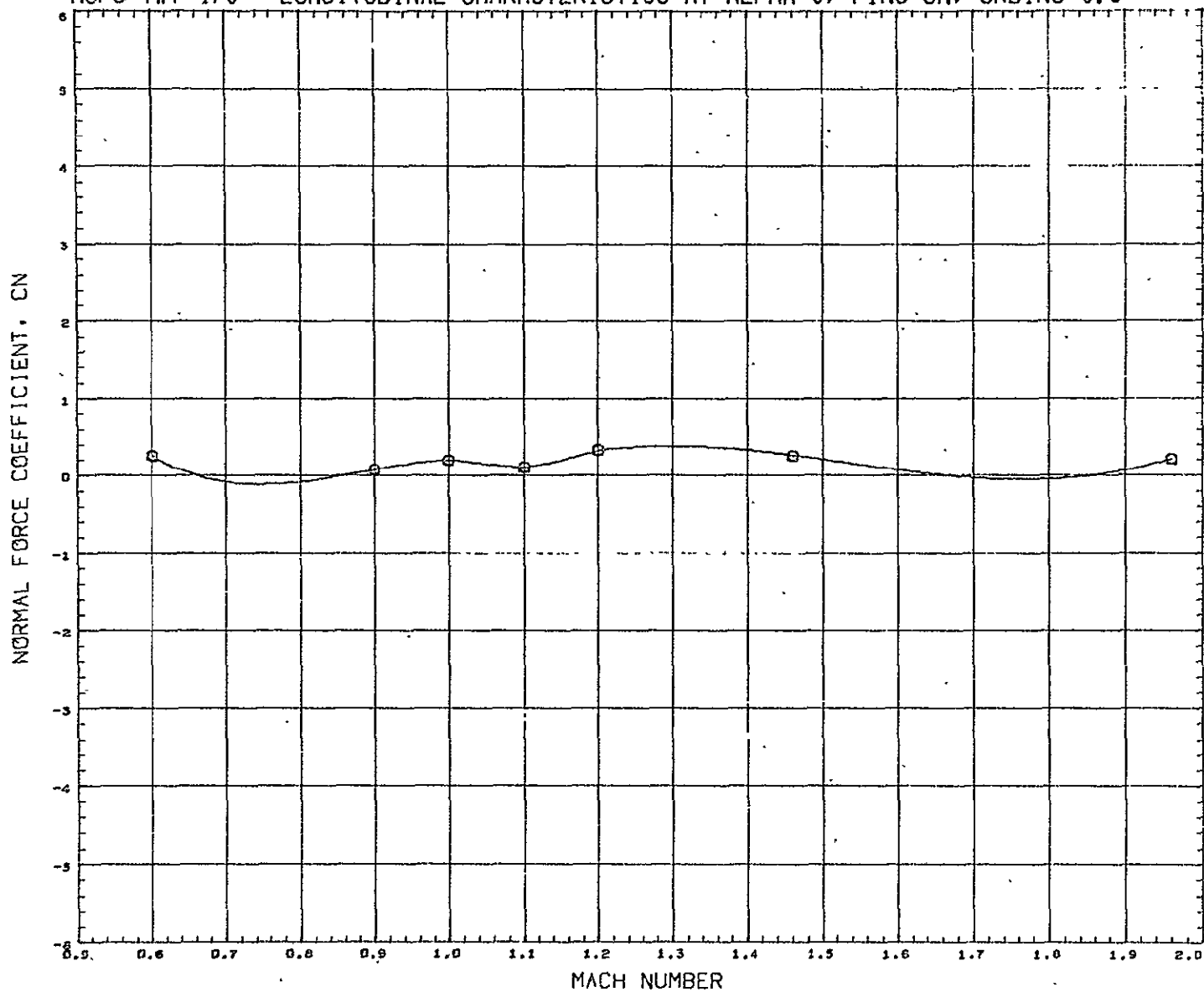


SYMBOL	MACH	PARAMETRIC VALUES			
○	1.200	BETA	- 0.050	ORBINC	- 1.050
□	1.302	WINGINC	4.000	HTAIL	0.000
◇	1.457	PHIB	0.000		
△	1.960				

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS ON, ORBINC=0.0

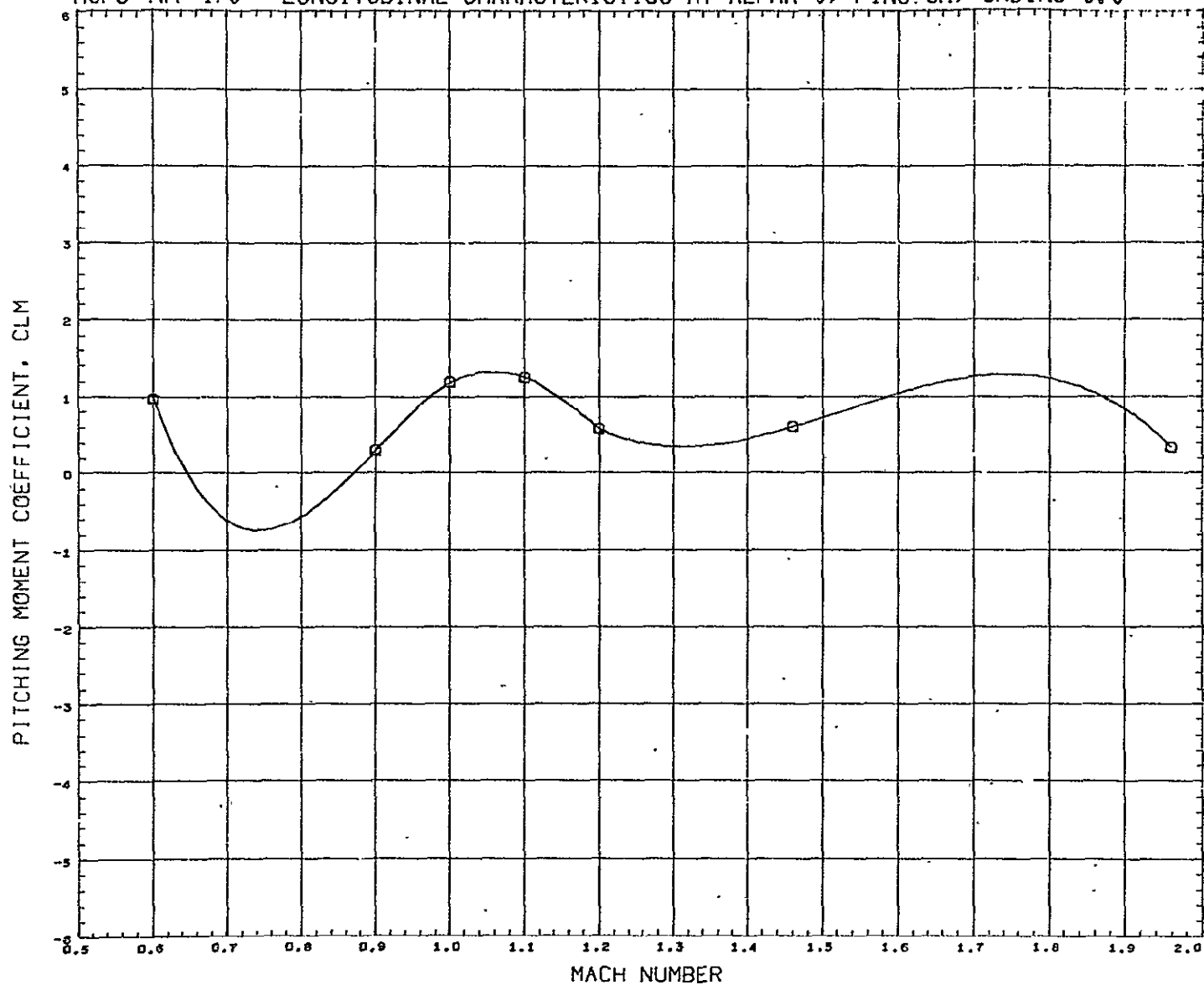


SYMBOL	ALPHA	PARAMETRIC VALUES			
Q	0.000	BETA	0.070	ORBINC	0.000
		MWGINC	4.000	HTAIL	0.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS ON, ORBINC=0.0

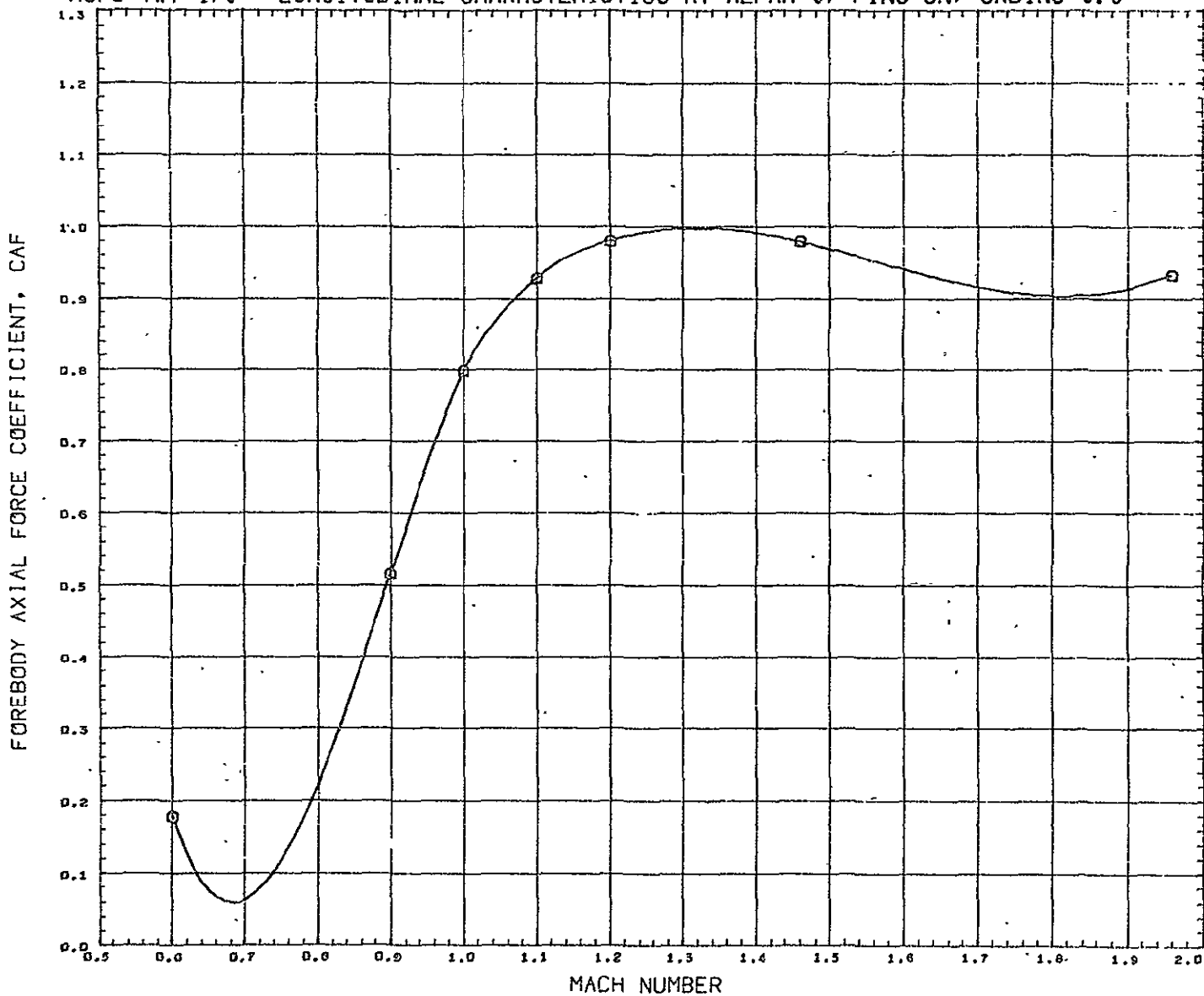


SYMBOL	ALPHA	PARAMETRIC VALUES			
Q	0.000	BETA	0.070	ORBINC	0.000
		WINGINC	4.000	MTAIL	0.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS ON, ORBINC=0.0

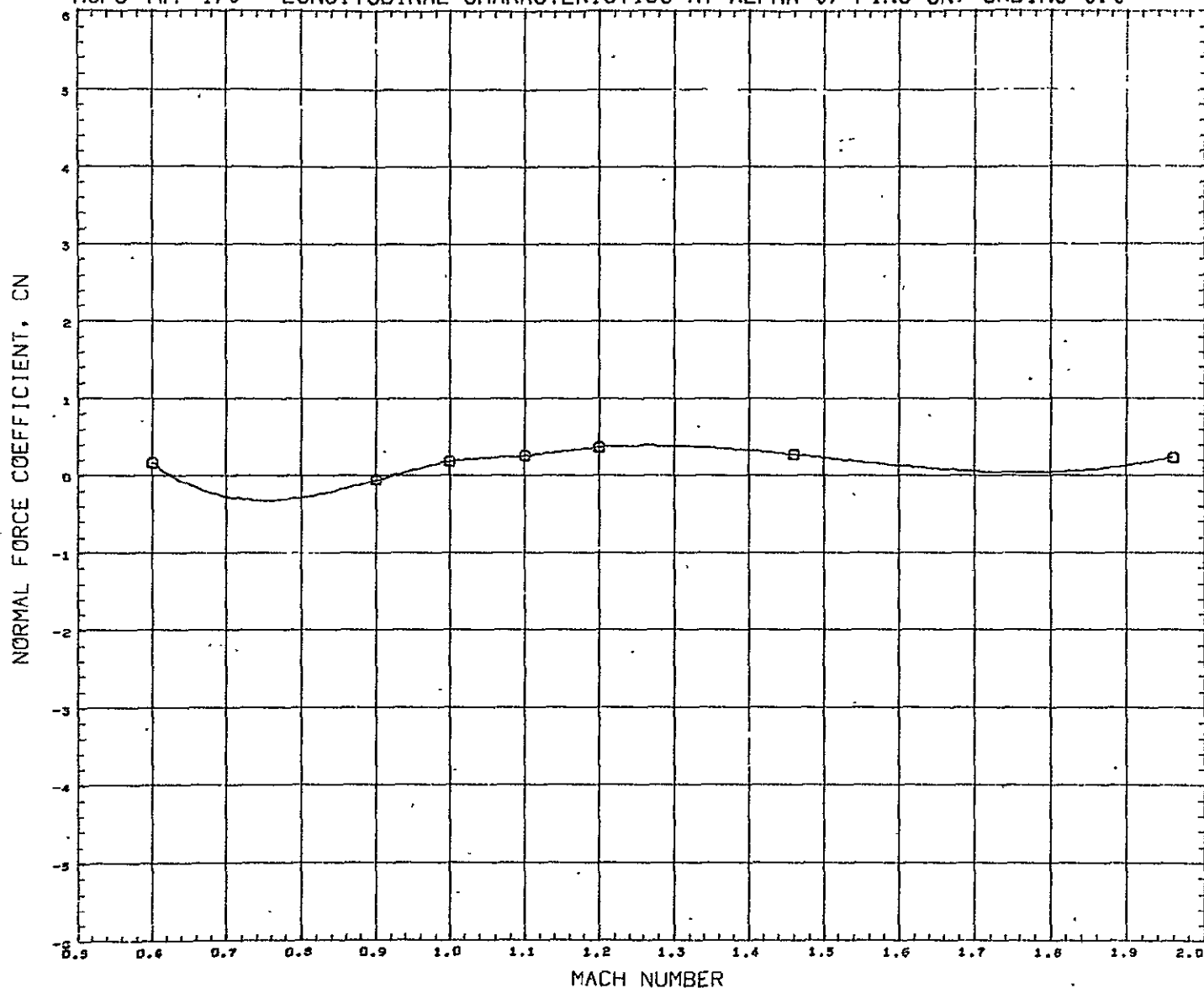


SYMBOL	ALPHA	PARAMETRIC VALUES			
Q	0.000	BETA	- 0.070	ORBINC	0.000
		WINGINC	4.000	HTAIL	0.000
		PNIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE V1

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS ON, ORBINC=0.0



SYMBOL	ALPHA	PARAMETRIC VALUES			
○	0.000	BETA	- 0.090	ORBINC	0.000
		WINGINC	4.000	HTAIL	0.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	sq. in.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

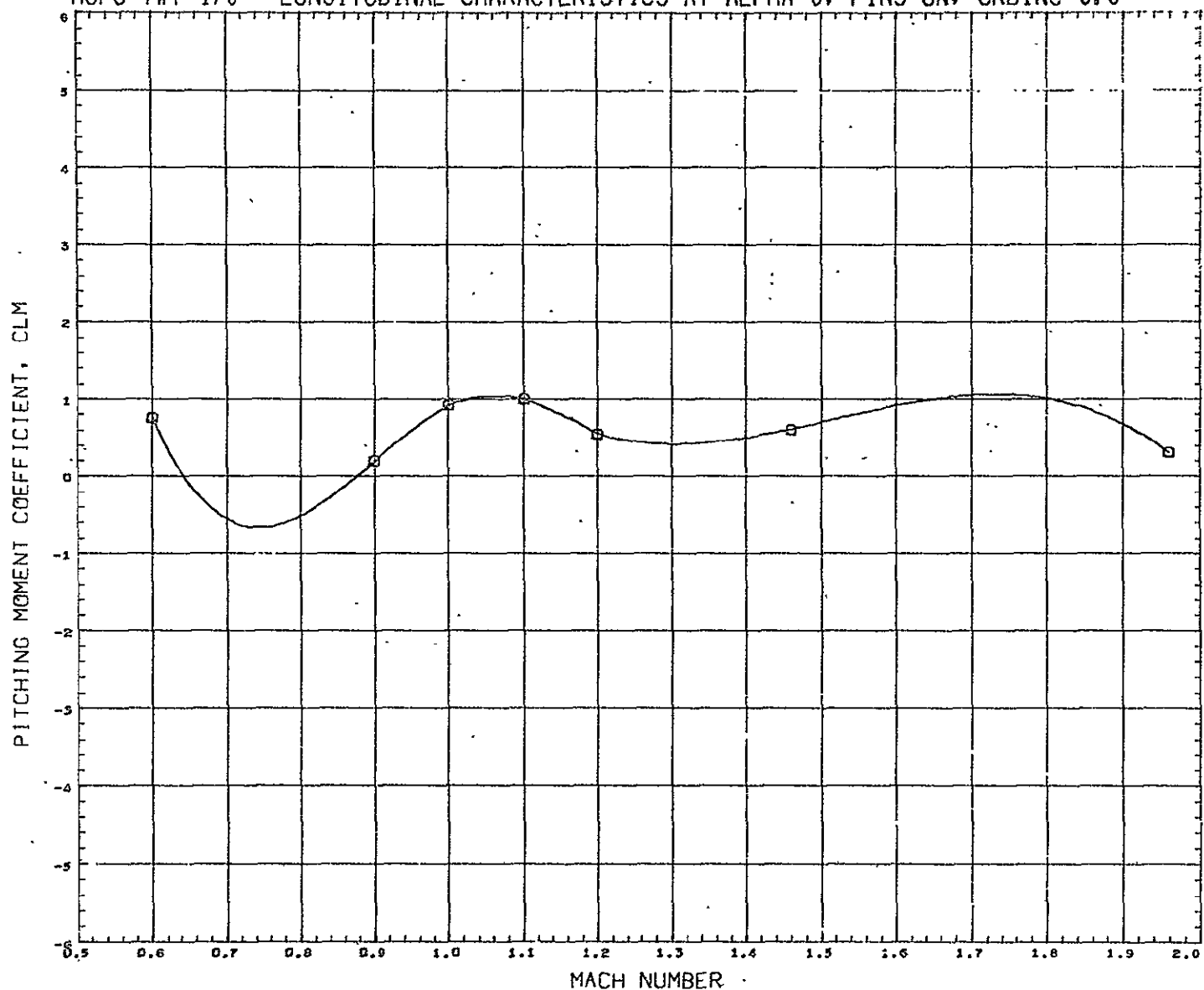
DATA HIST. CODE VI

TWT470 S-IC/GAC ORBITER BF10WHVS FINS ON

CH24021) 29 JAN 71

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS ON, ORBINC=0.0

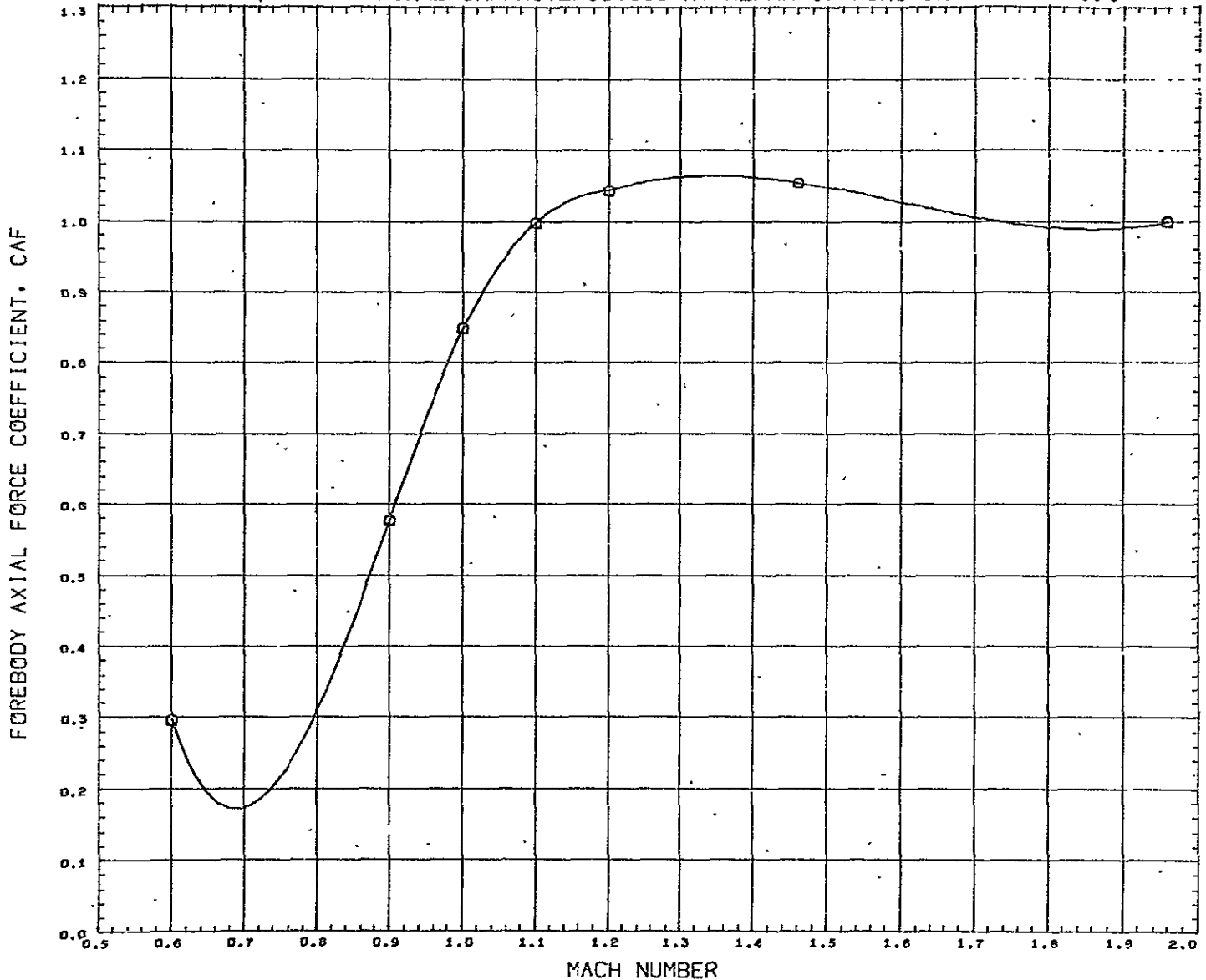


SYMBOL	ALPHA	PARAMETRIC VALUES			
□	0.000	BETA	0.090	ORBINC	0.000
		WINGINC	4.000	HTAIL	0.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	30. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS ON, ORBINC=0.0



SYMBOL	ALPHA	PARAMETRIC VALUES			
Q	0.000	BETA	0.000	ORBINC	0.000
		WNGINC	4.000	HTAIL	0.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

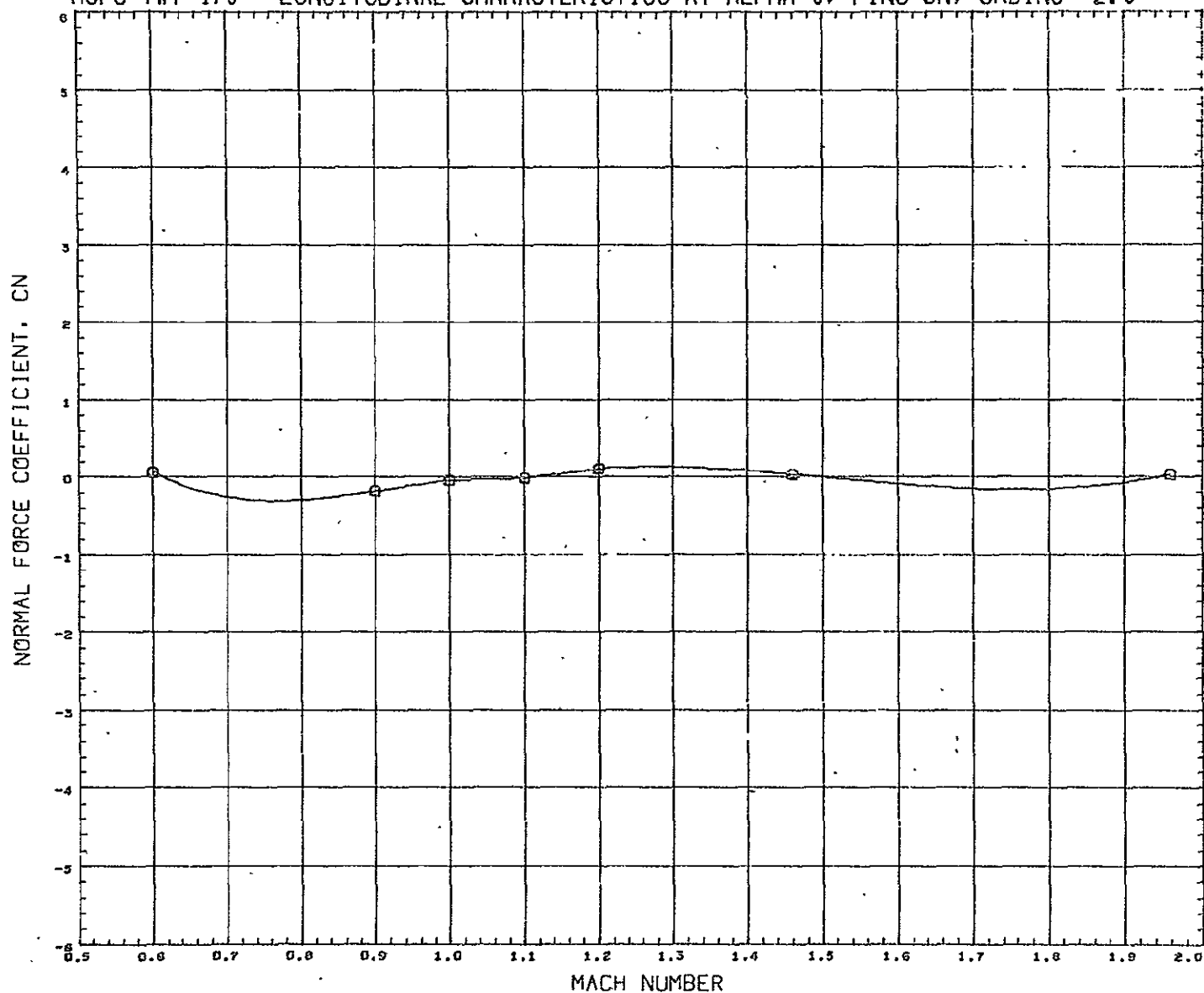
DATA HIST. CODE VI

TWT470 S-IC/GAC ORBITER BF10WHVS FINS ON

(H24021) 29 JAN 71

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS ON, ORBINC=-2.0



SYMBOL	ALPHA	PARAMETRIC VALUES			
□	0.000	BETA	- 0.070	ORBINC	- 2.000
		WINGINC	4.000	MTAIL	0.000
		PMIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

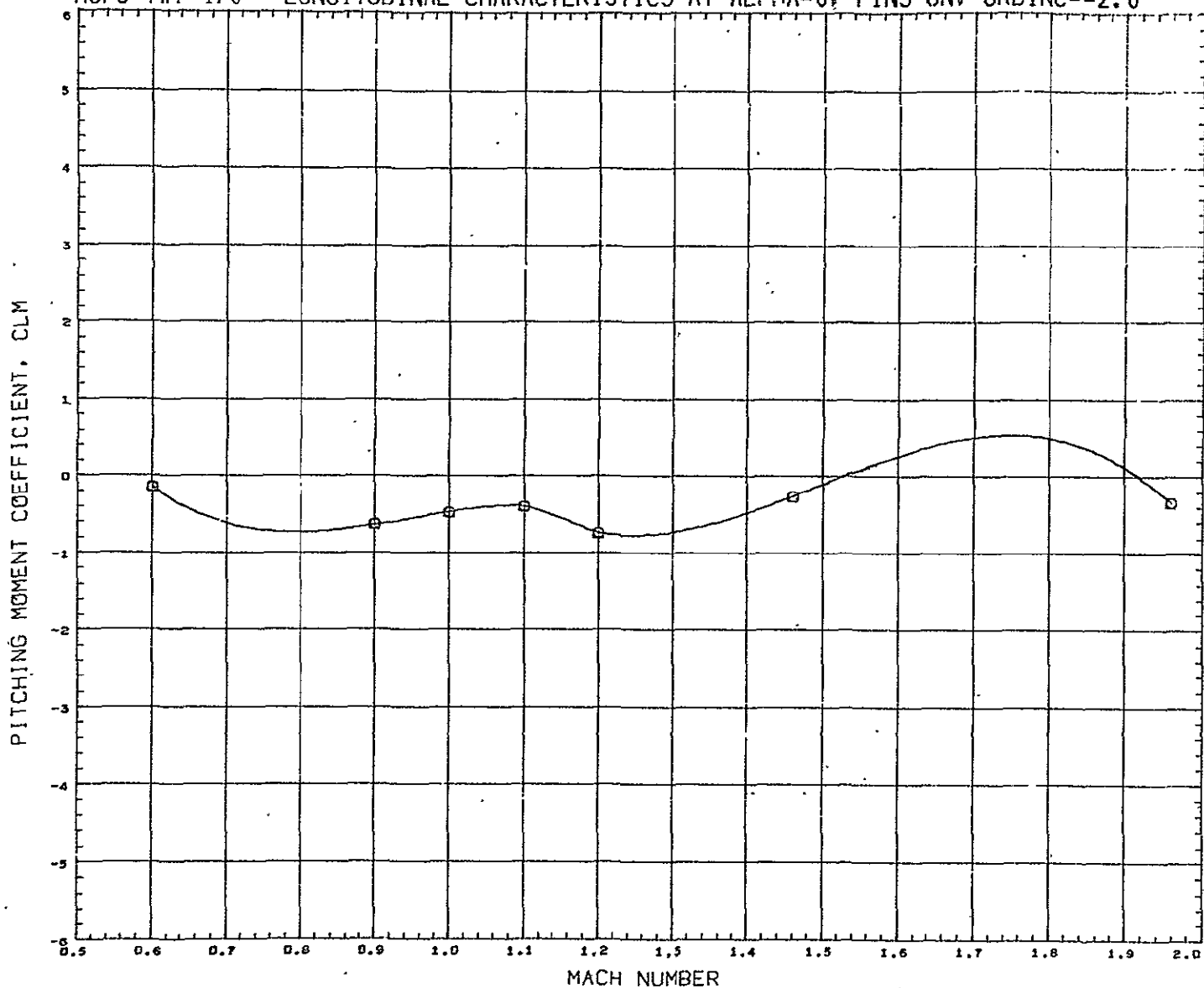
DATA HIST. CODE VI

TWT470 S-IC/GAC ORBITER BF10WHVS FINS ON

(H24031) 29 JAN 71

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS ON, ORBINC=-2.0



SYMBOL	ALPHA	PARAMETRIC VALUES	
Q	0.000	BETA - 0.070	ORBINC - 2.000
		WINGINC 4.000	HTAIL 0.000
		PNIB 0.000	

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

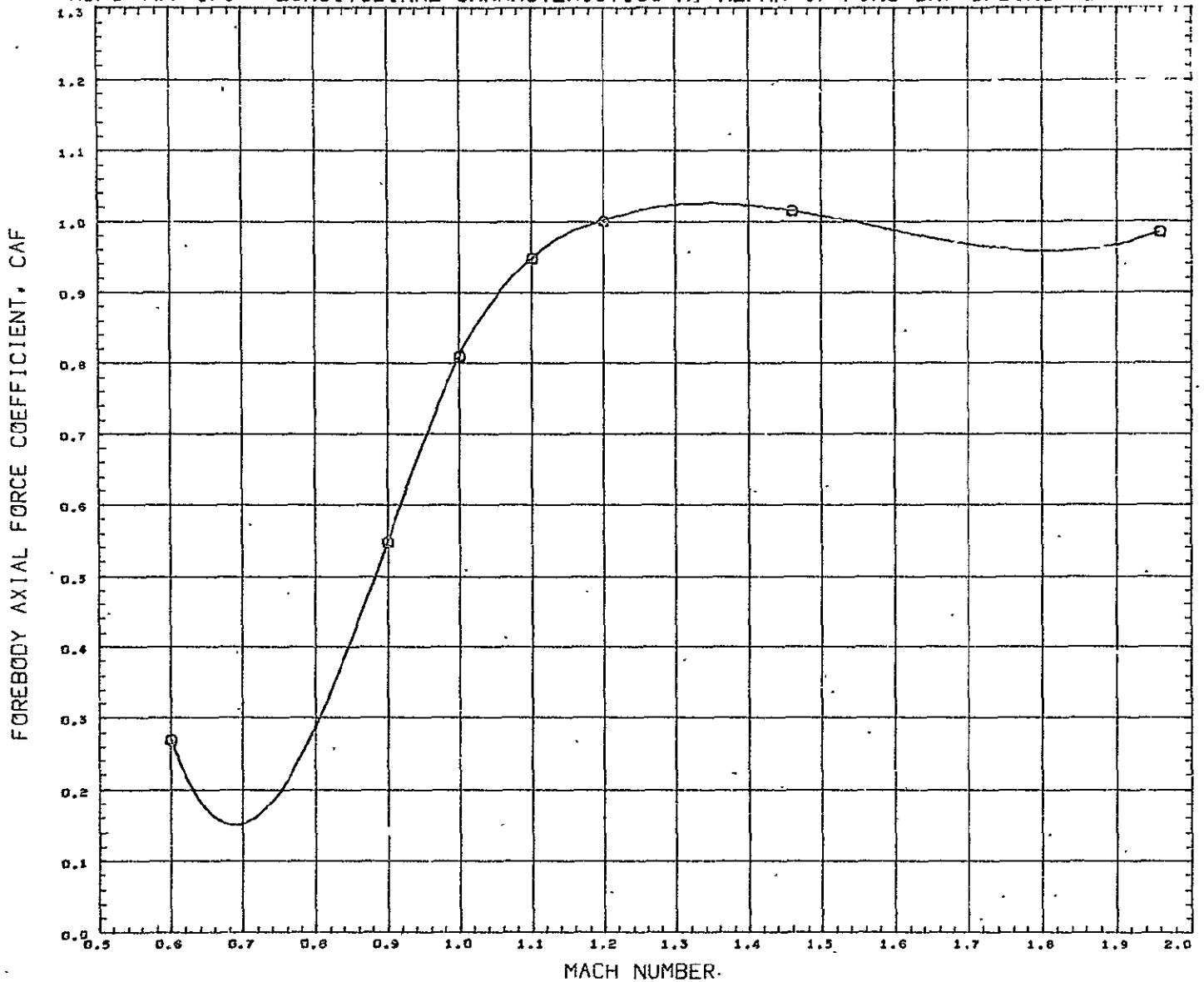
DATA HIST. CODE VI

TWT470 S-IC/GAC ORBITER BF10WHVS FINS ON

(H24031) 29 JAN 71

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS ON, ORBINC=-2.0

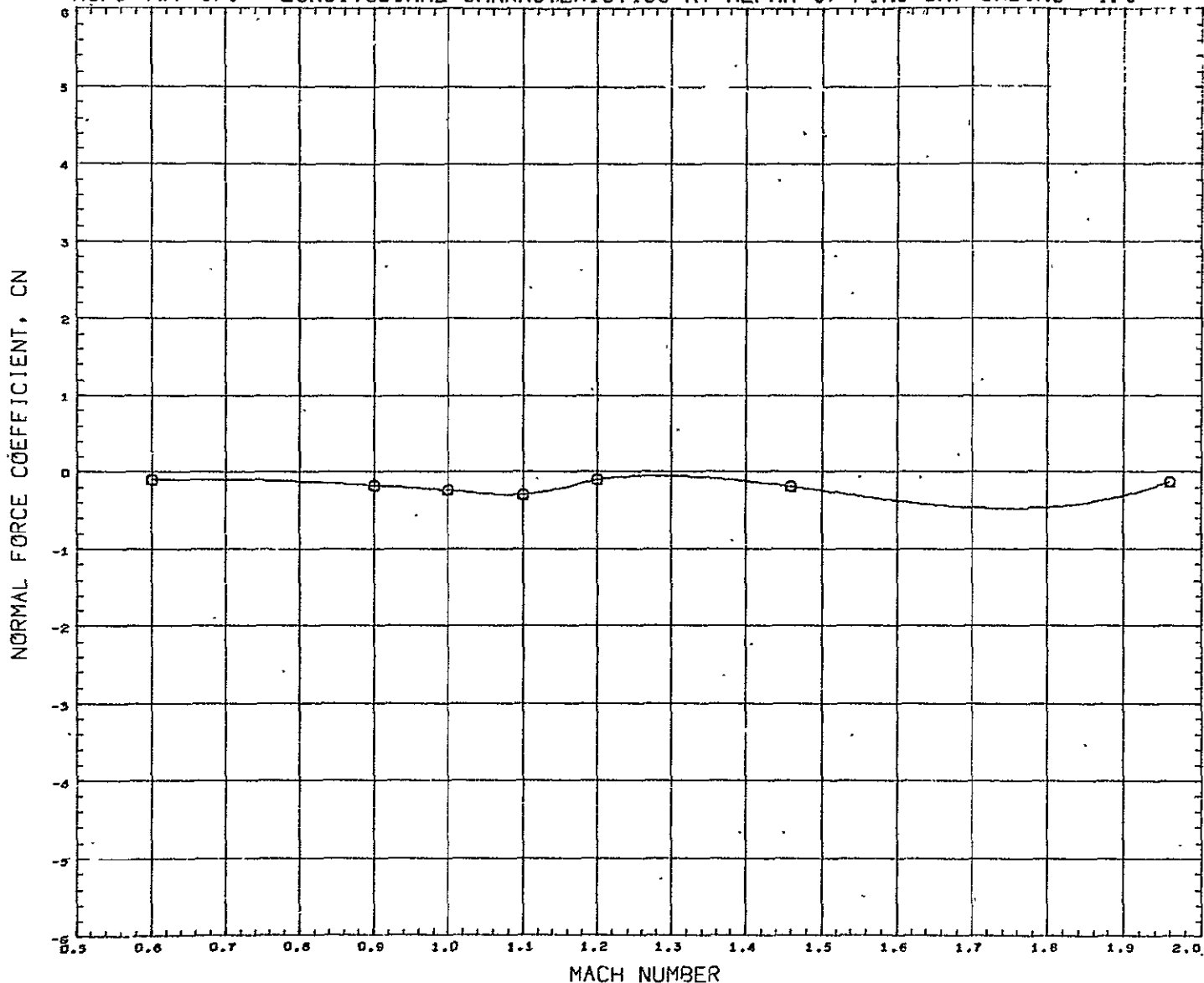


SYMBOL	ALPHA	PARAMETRIC VALUES			
0	0.000	BETA	- 0.070	ORBINC	- 2.000
		WINGINC	4.000	HTAIL	0.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	50.1 IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS ON, ORBINC=-4.0



SYMBOL	ALPHA	PARAMETRIC VALUES			
Q	0.000	BETA	- 0.050	ORBINC	- 4.000
		WINGINC	4.000	HTAIL	0.000
		PHID	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

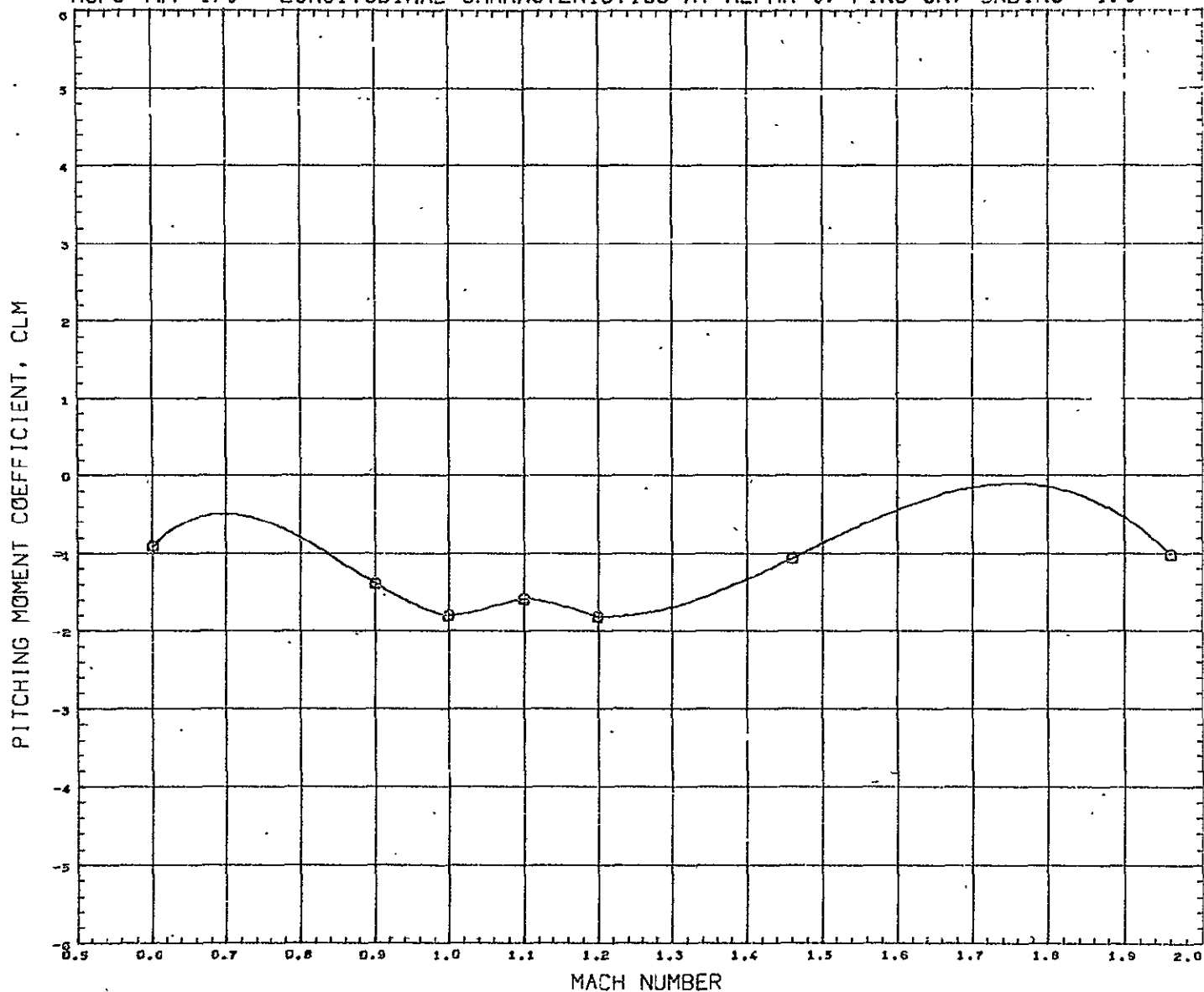
DATA HIST. CODE VI

TWT470 S-IC/GAC ORBITER BF10WHVS FINS ON

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS ON, ORBINC=-4.0

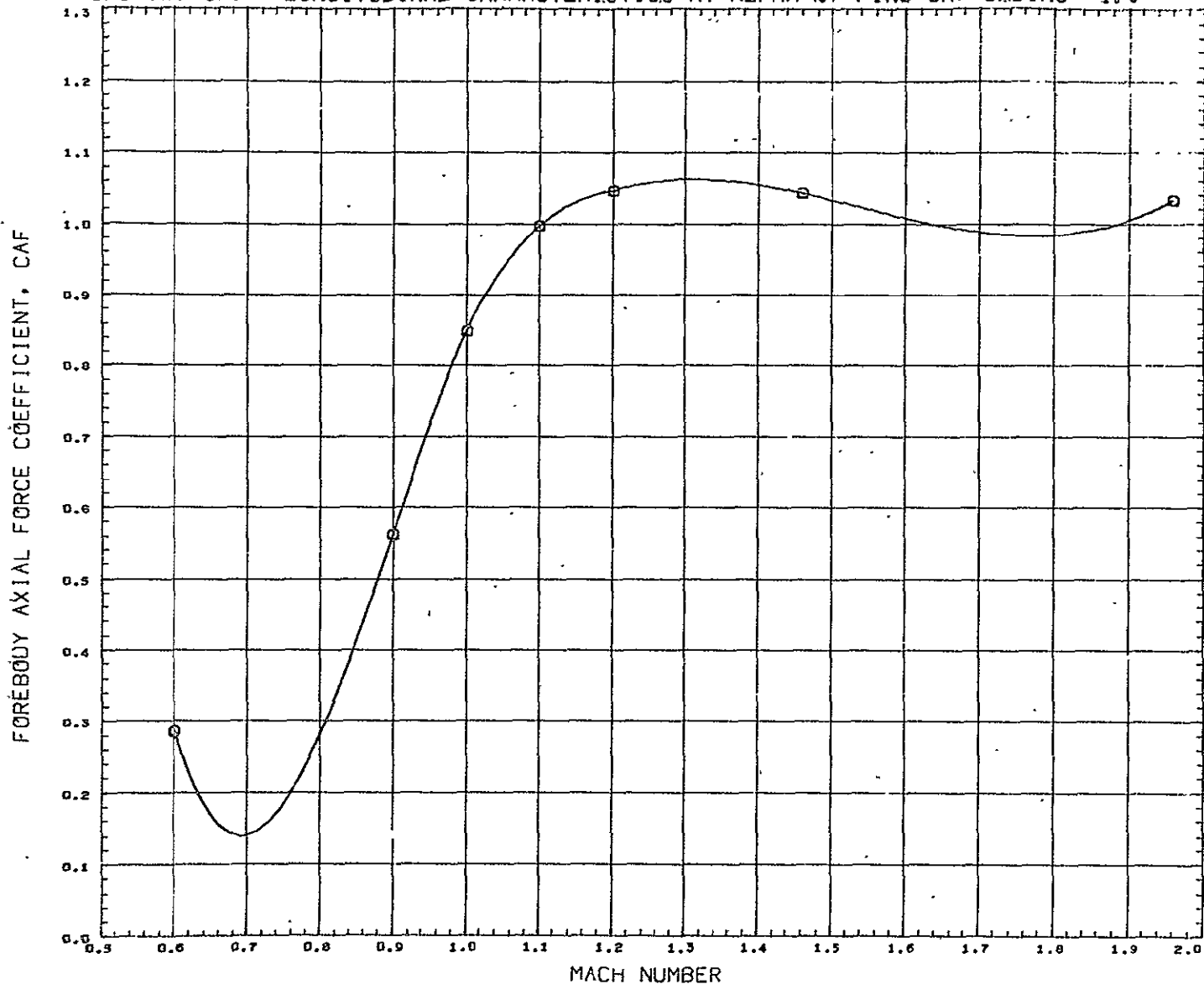


SYMBOL	ALPHA	PARAMETRIC VALUES			
□	0.000	BETA	- 0.050	ORBINC	- 4.000
		WHGINC	4.000	HTAIL	0.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS ON, ORBINC=-4.0

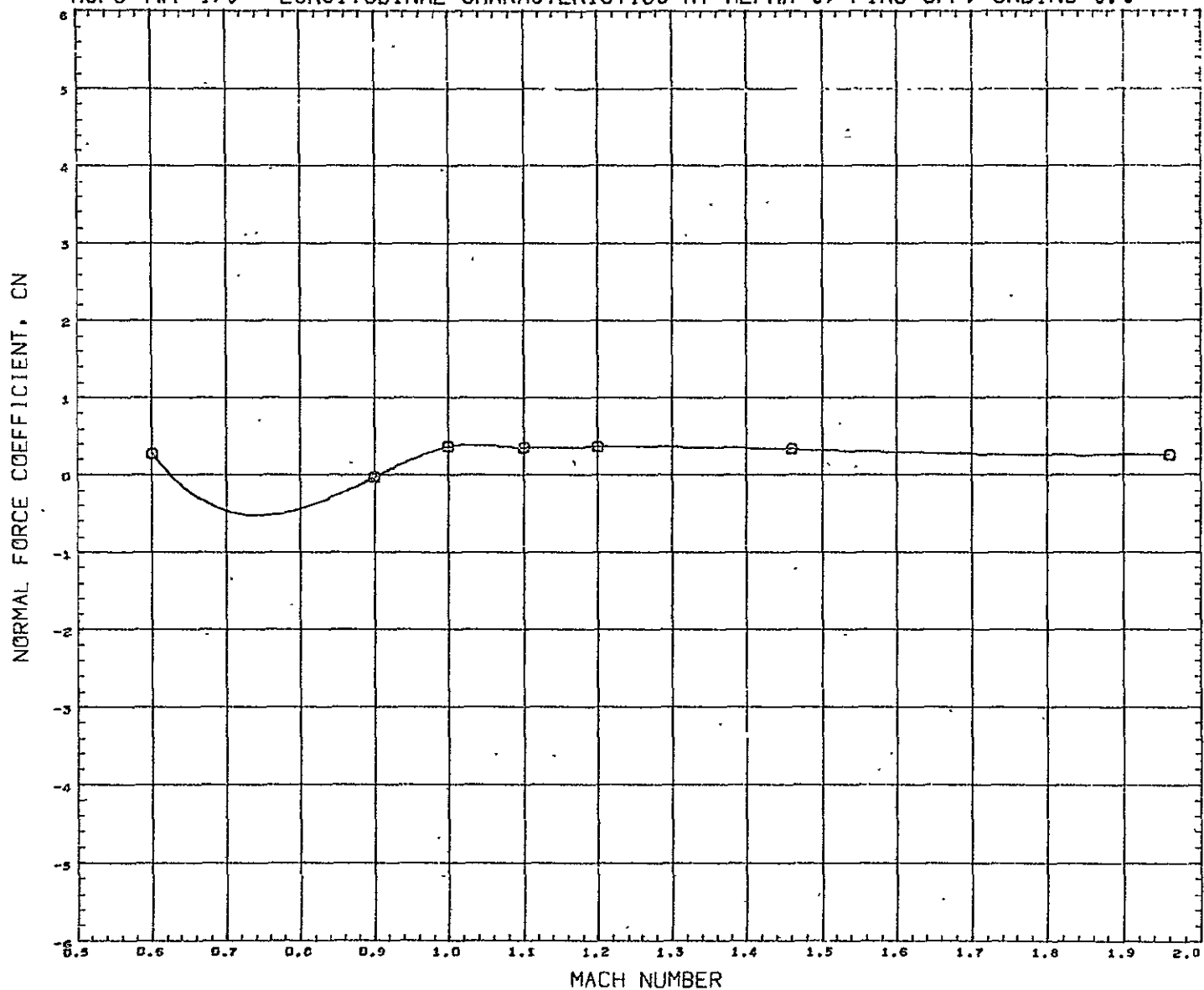


SYMBOL	ALPHA	PARAMETRIC VALUES			
□	0.000	BETA	- 0.050	ORBINC	- 4.000
		WINGINC	4.000	HTAIL	0.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	50. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS OFF, ORBINC=0.0

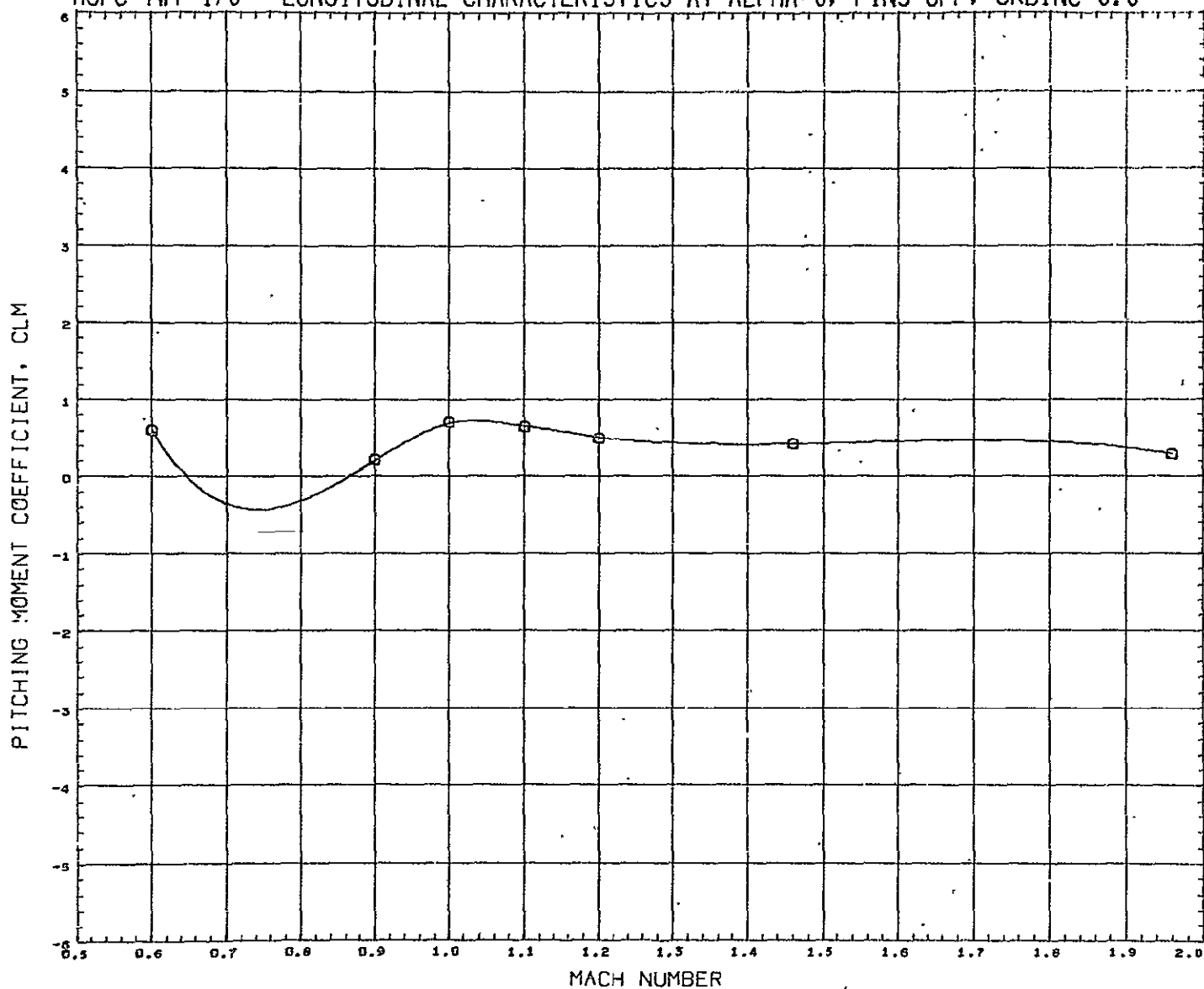


SYMBOL	ALPHA	PARAMETRIC VALUES			
O	0.000	BETA	- 0.050	ORBINC	0.000
		WINGINC	4.000	HTAIL	0.000
		PHIS	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCNT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS OFF, ORBINC=0.0

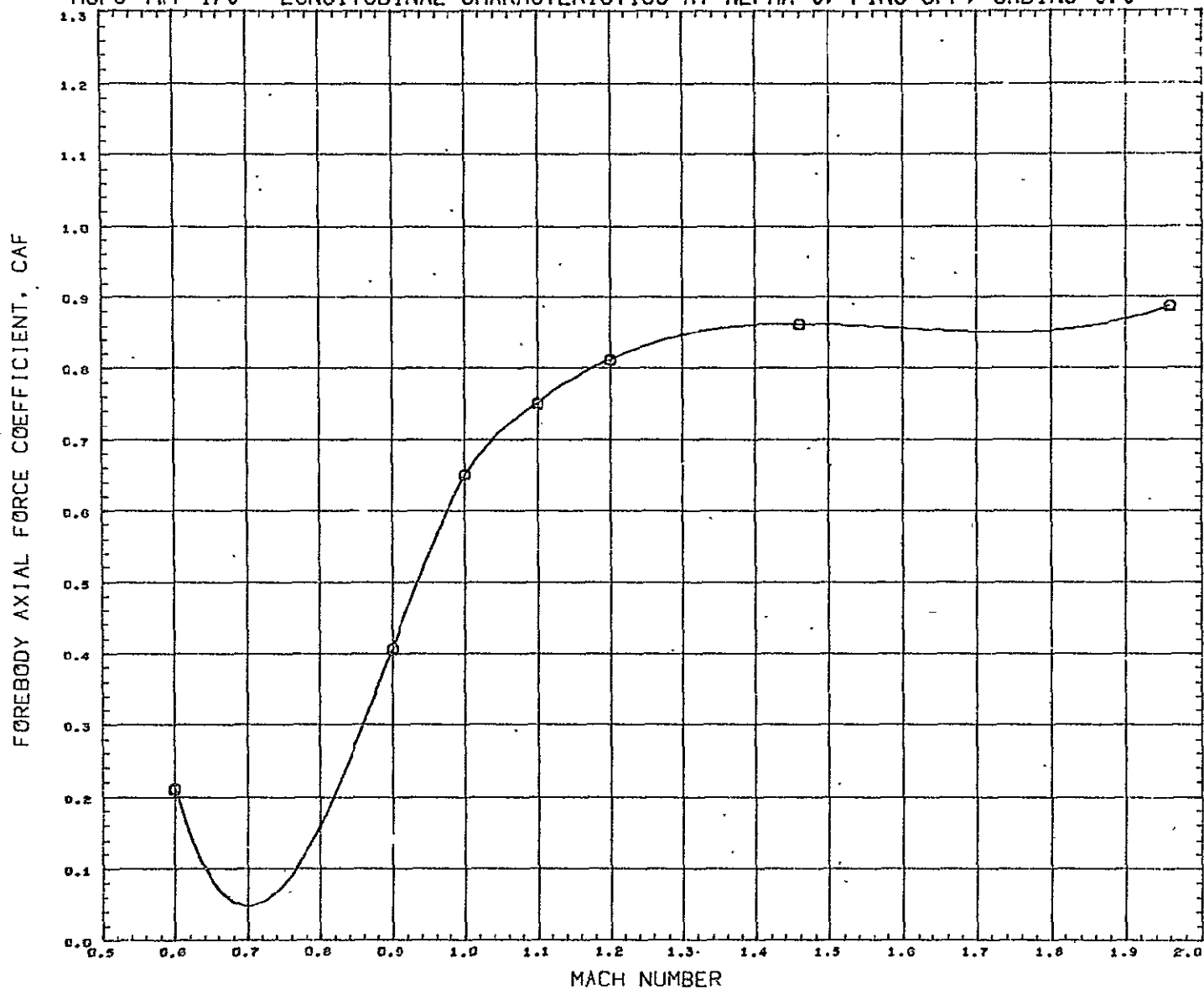


SYMBOL	ALPHA	PARAMETRIC VALUES			
0	0.000	BETA	- 0.030	ORBINC	0.000
		WINGINC	4.000	HTAIL	0.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	50. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS OFF, ORBINC=0.0

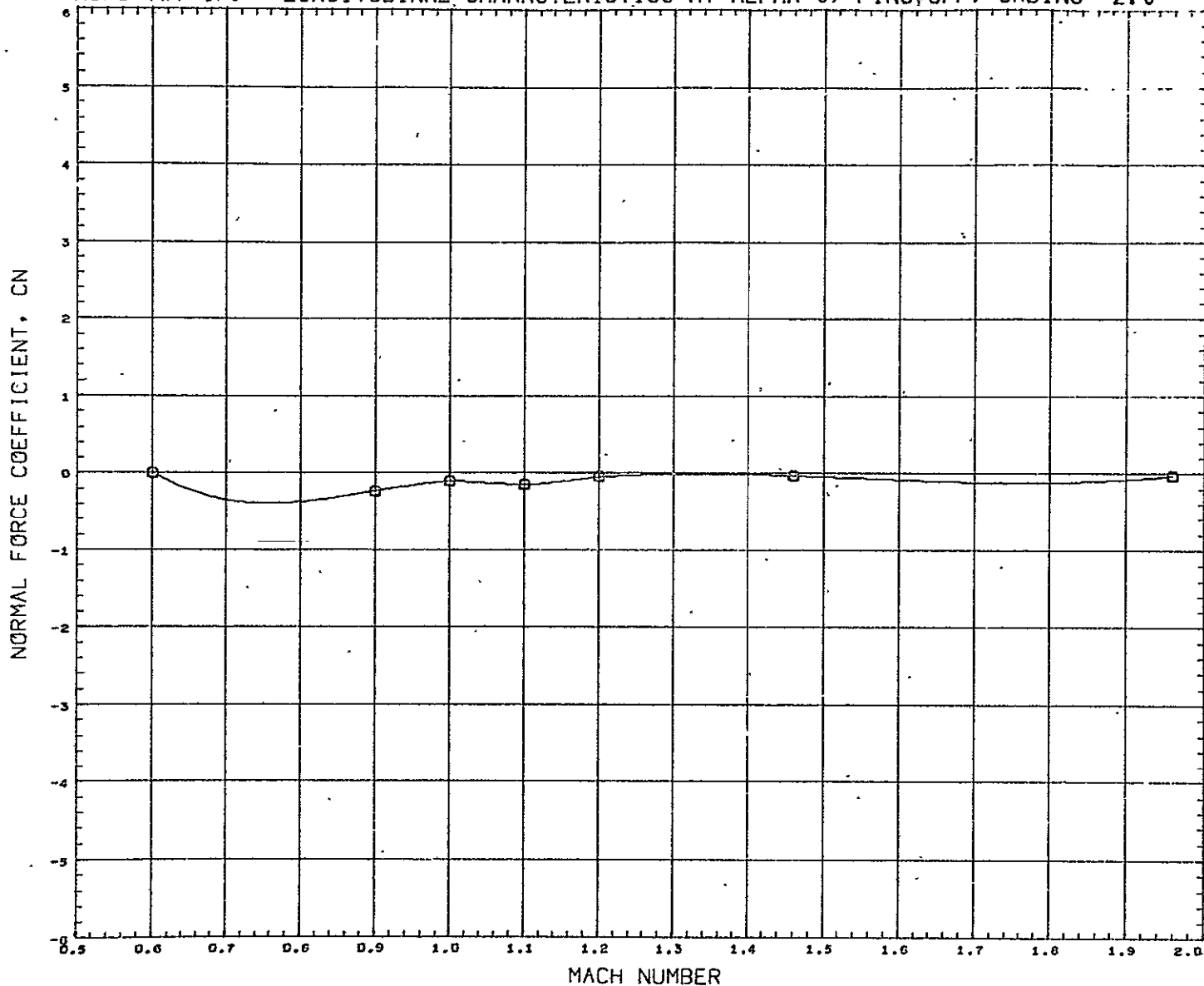


SYMBOL	ALPHA	PARAMETRIC VALUES			
○	0.000	BETA	- 0.050	ORBINC	0.000
		WINGINC	4.000	HTAIL	0.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS OFF, ORBINC=-2.0

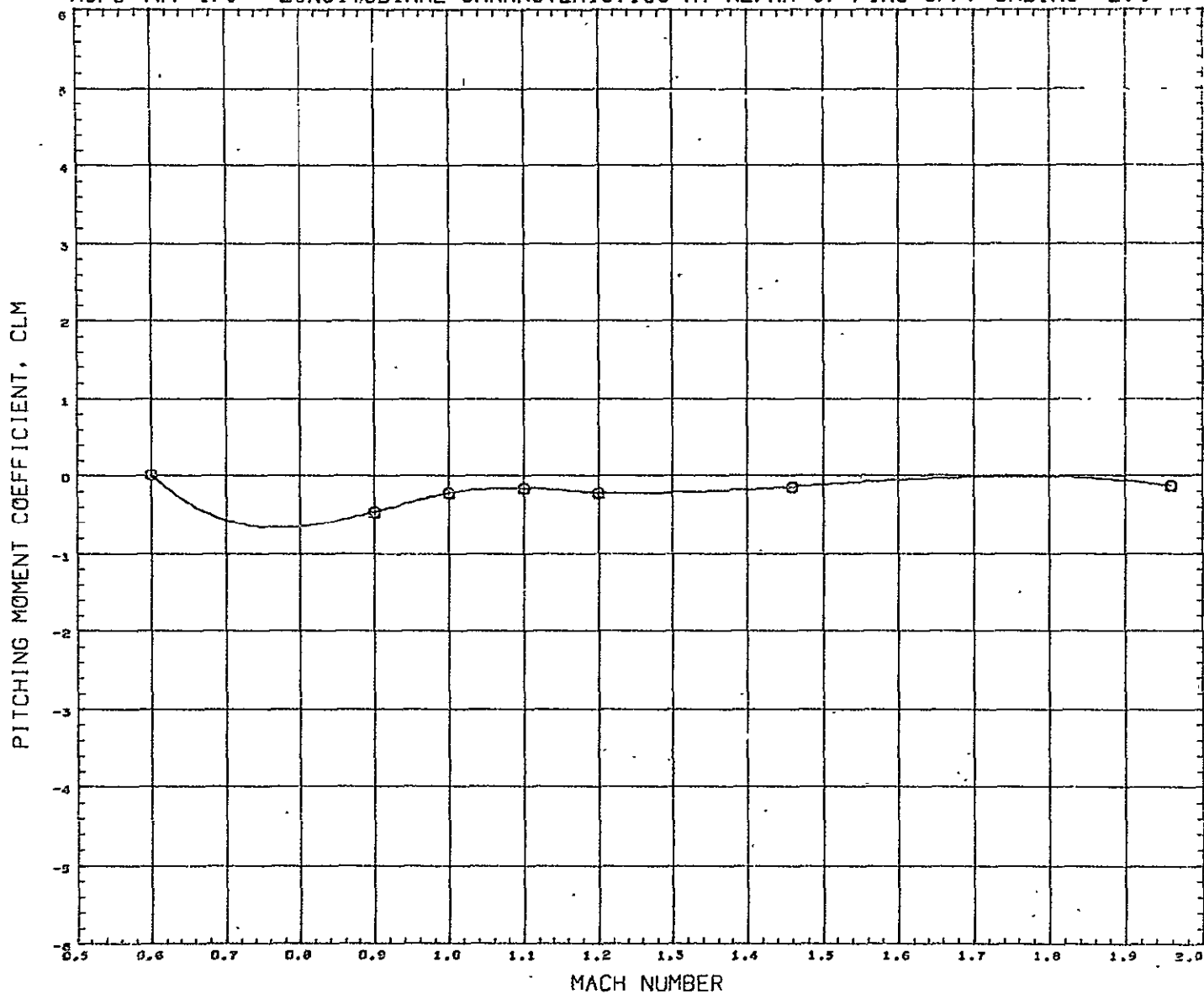


SYMBOL	ALPHA	PARAMETRIC VALUES			
Q	0.000	DETA	- 0.000	ORBINC	- 2.000
		WINGINC	4.000	HTAIL	0.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE - VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS OFF, ORBINC=-2.0

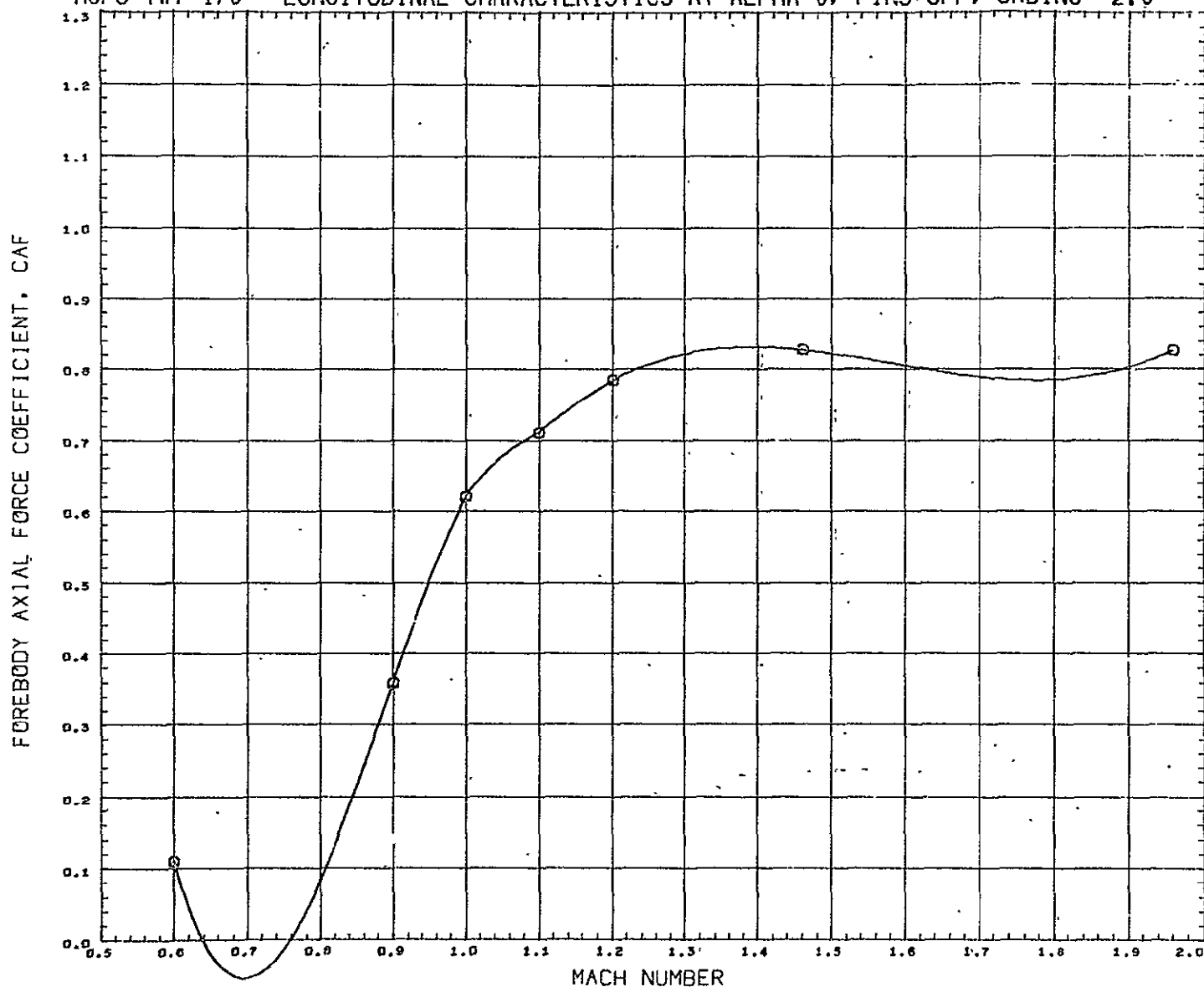


SYMBOL	ALPHA	PARAMETRIC VALUES			
Q	0.000	DETA	- 0.080	ORBINC	- 2.000
		WINGINC	4.000	HTAIL	0.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS OFF, ORBINC=-2.0

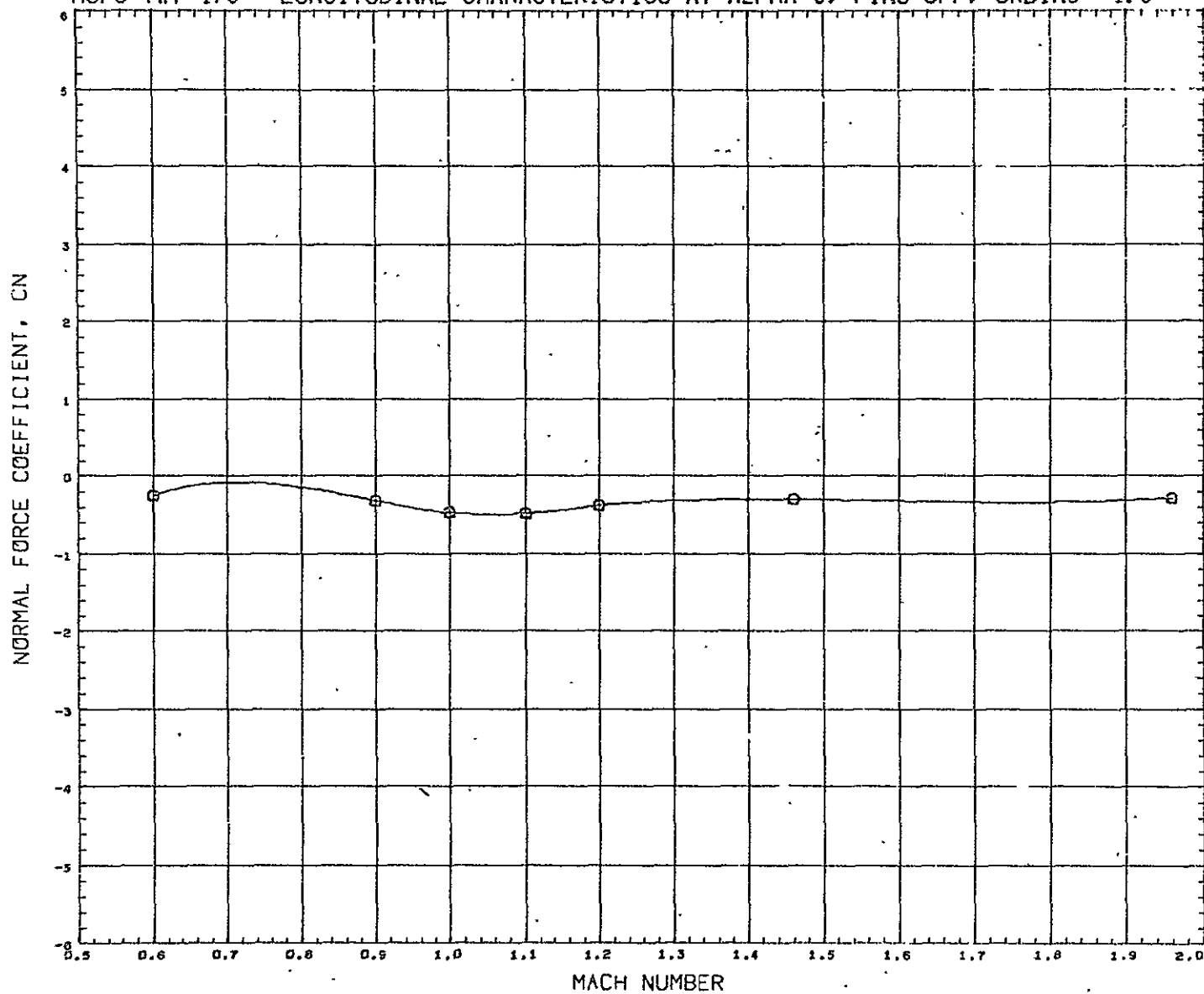


SYMBOL	ALPHA	PARAMETRIC-VALUES			
○	0.000	BETA	- 0.080	ORBINC	- 2.000
		WINGINC	4.000	MTAIL	0.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE - VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS OFF, ORBINC=-4.0

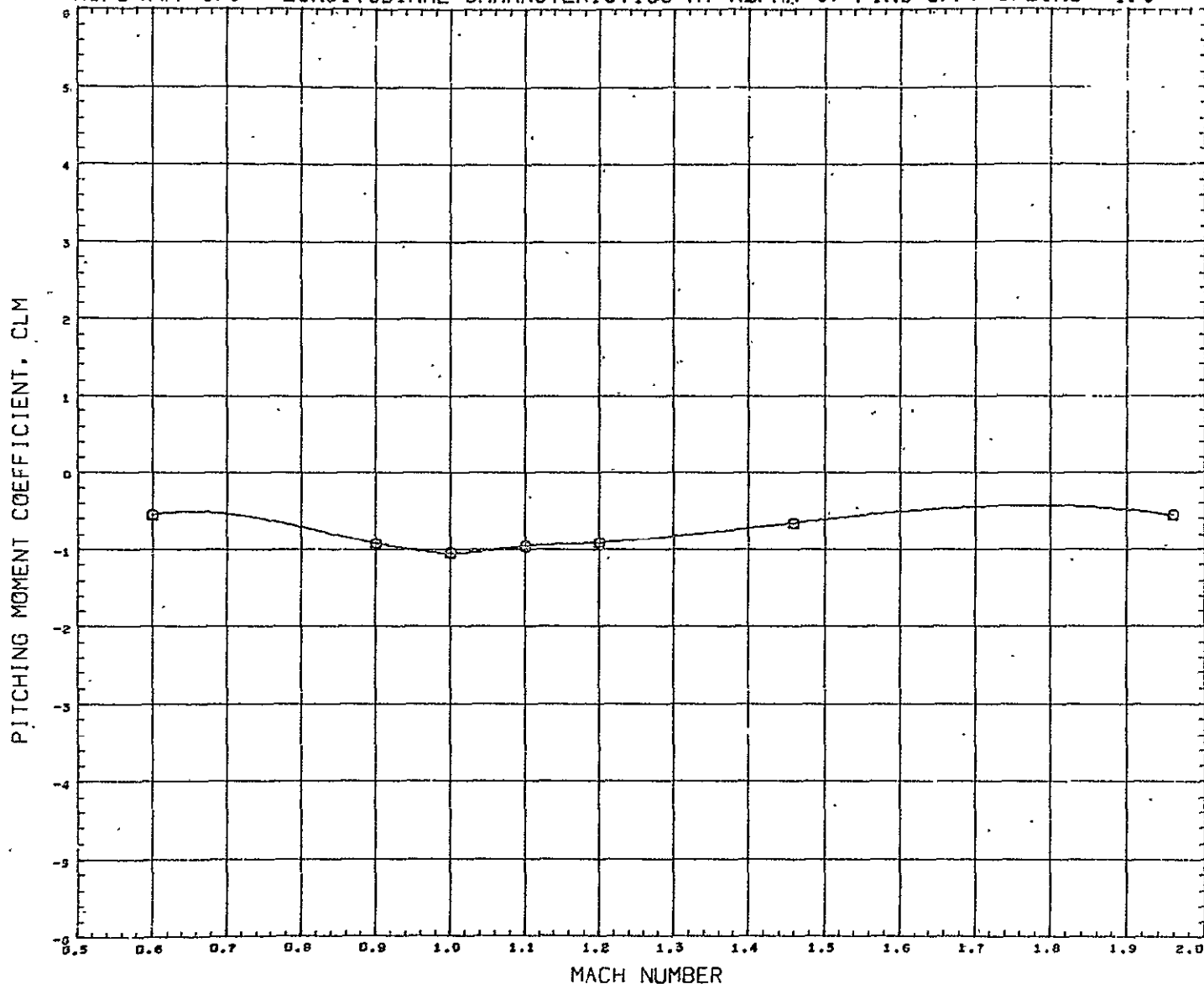


SYMBOL	ALPHA	PARAMETRIC VALUES			
0	0.000	BETA	- 0.040	ORBINC	- 4.000
		WINGINC	4.000	HTAIL	0.000
		PHID	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS OFF, ORBINC=-4.0

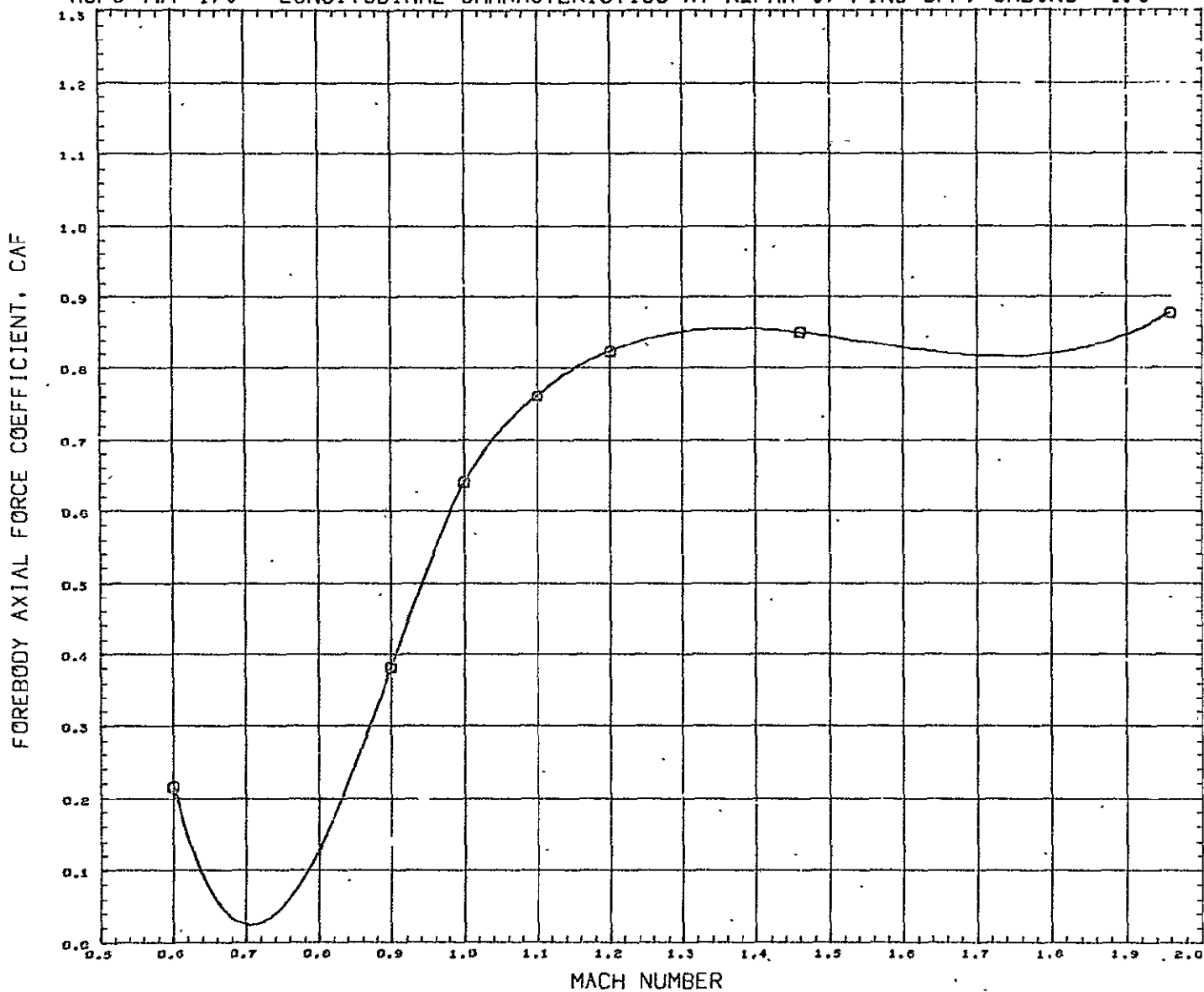


SYMBOL	ALPHA	PARAMETRIC VALUES			
0	0.000	BETA	- 0.040	ORBINC	- 4.000
		WINGINC	4.000	HTAIL	0.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS OFF, ORBINC=-4.0

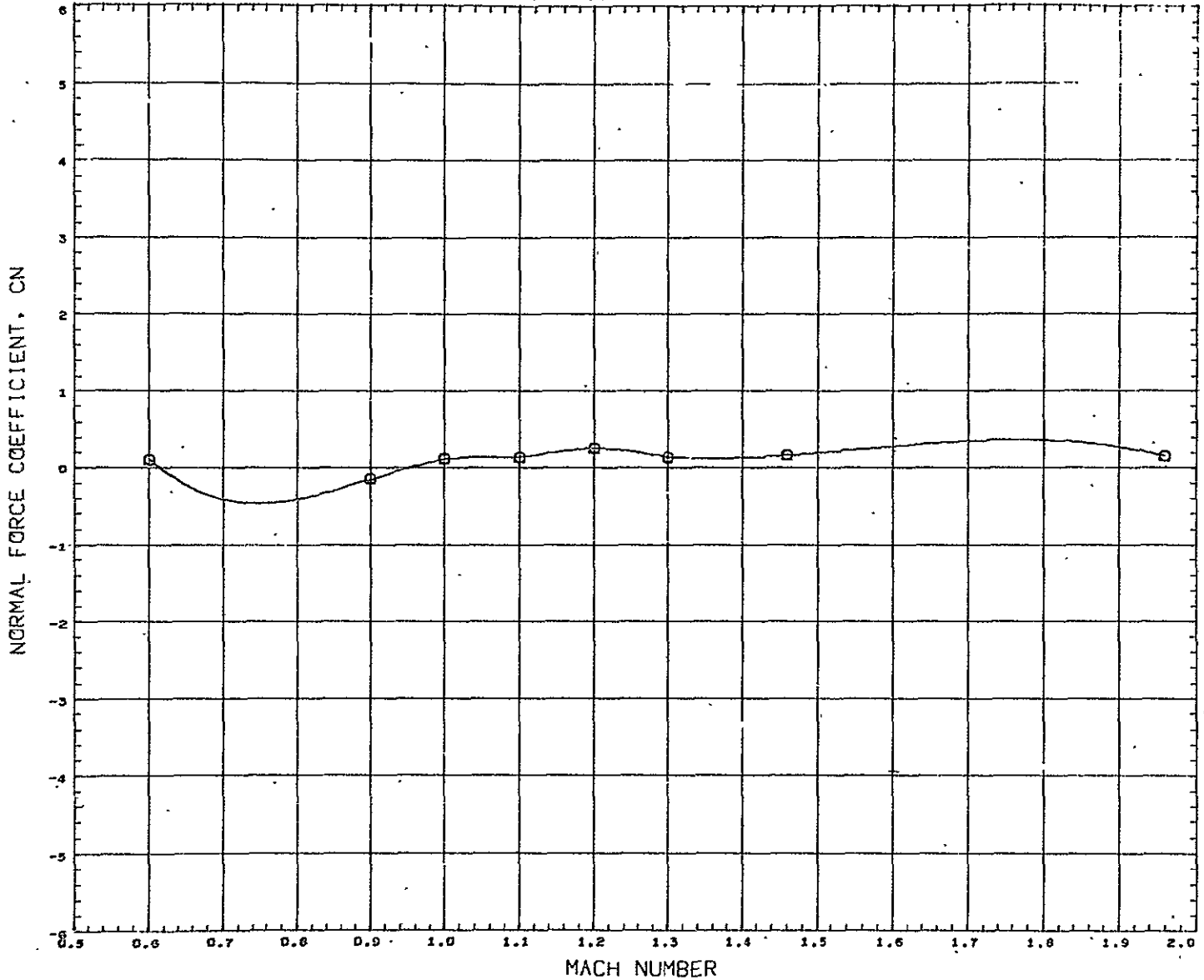


SYMBOL	ALPHA	PARAMETRIC VALUES			
0	0.000	BETA	- 0.040	ORBINC	- 4.000
		WINGINC	4.000	MTAIL	0.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE - VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS ON, ORBINC=-1.05



SYMBOL	ALPHA	PARAMETRIC VALUES			
Q	0.000	BETA	- 0.050	ORBINC	- 1.050
		WINGINC	4.000	HTAIL	0.000
		FHIB	0.000		

DATA HIST. CODE VI

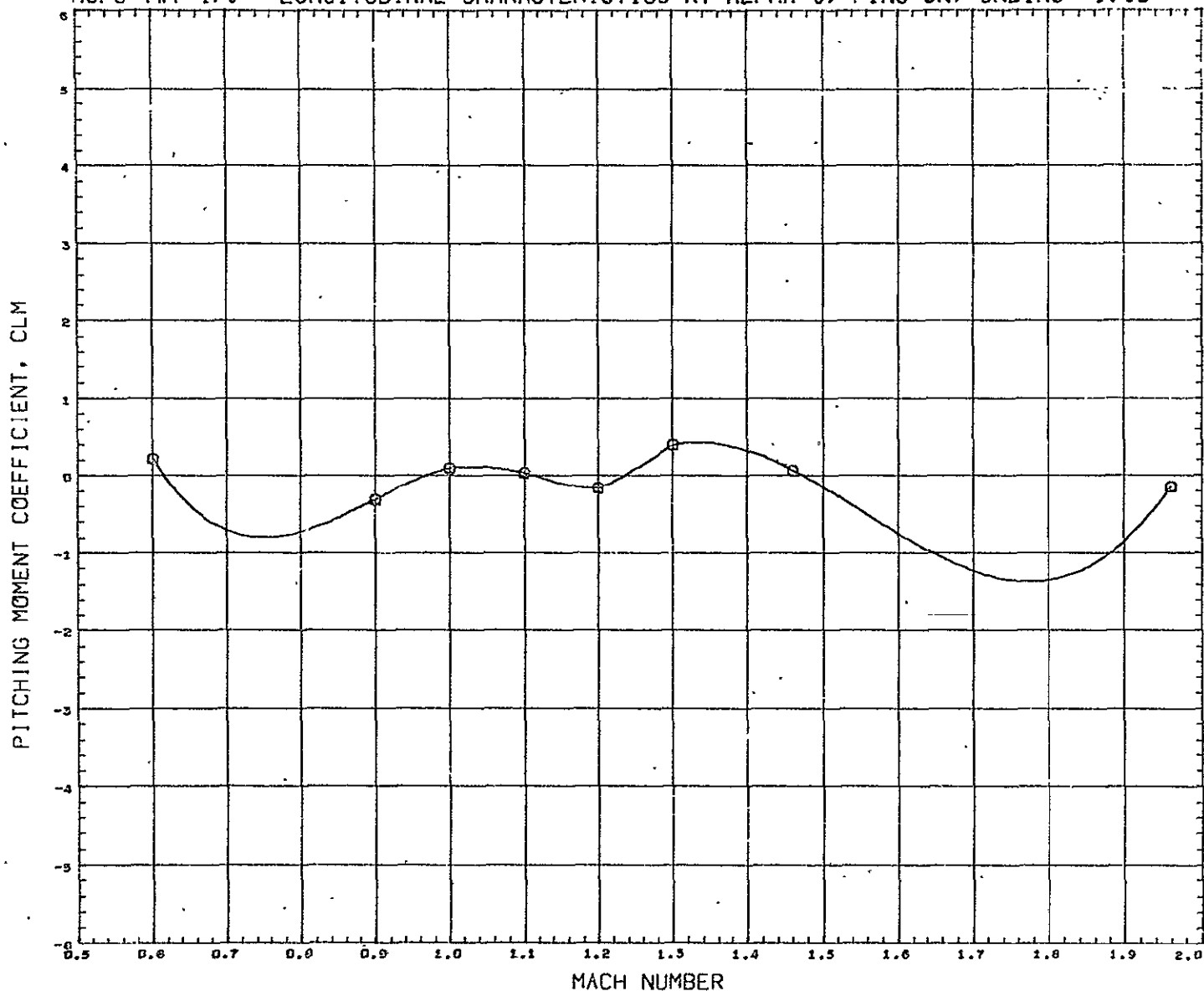
REFERENCE INFORMATION		
REFS	1.3960	50. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS ON, ORBINC=-1.05



SYMBOL	ALPHA	PARAMETRIC VALUES			
Q	0.000	BETA	- 0.050	ORBINC	- 1.050
		WINGINC	4.000	HTAIL	0.000
		PHIB	0.000		

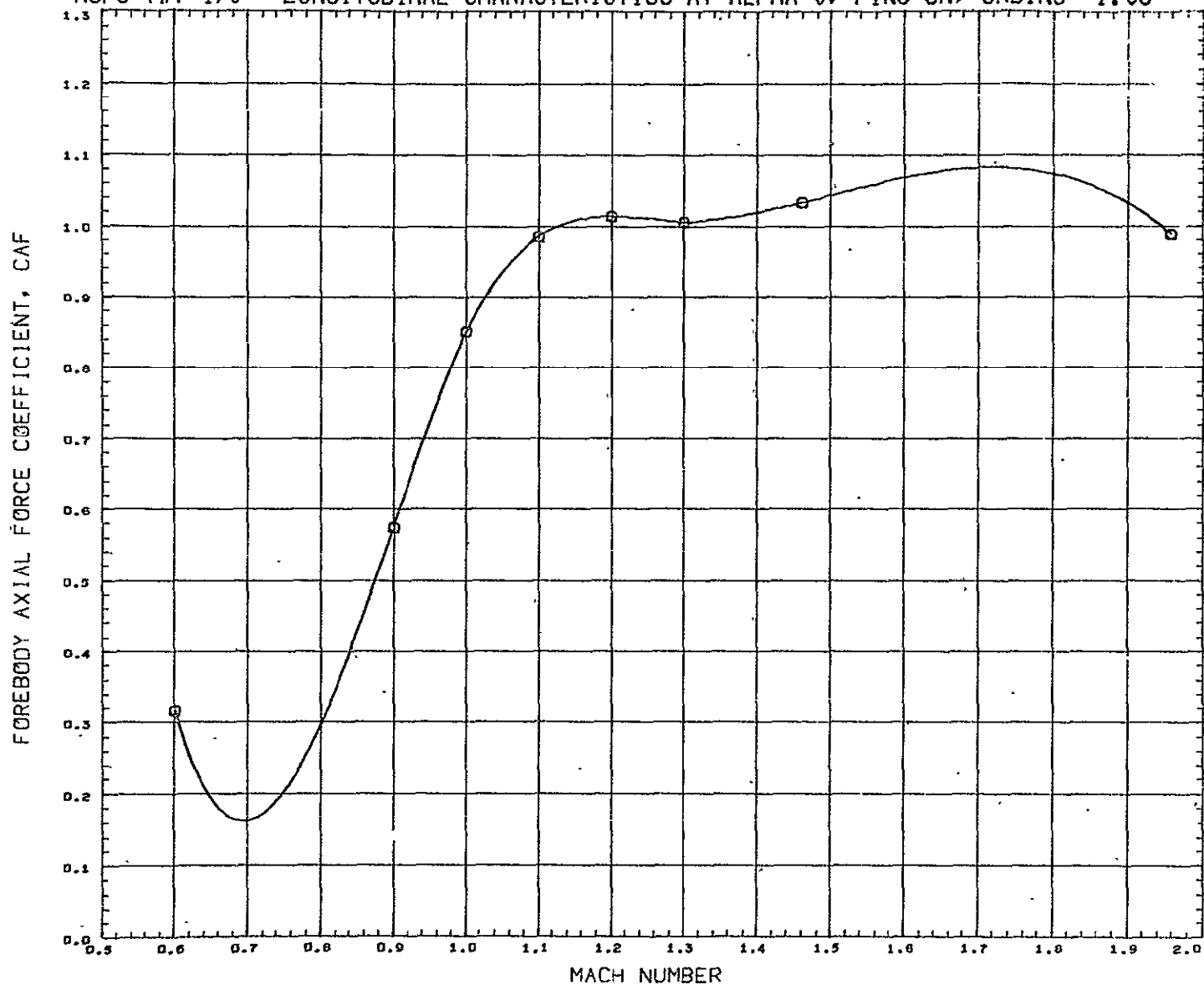
REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS ON, ORBINC=-1.05



SYMBOL	ALPHA	PARAMETRIC VALUES			
0	0.000	BETA	- 0.050	ORBINC	- 1.050
		WINGINC	4.000	HTAIL	0.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFD	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

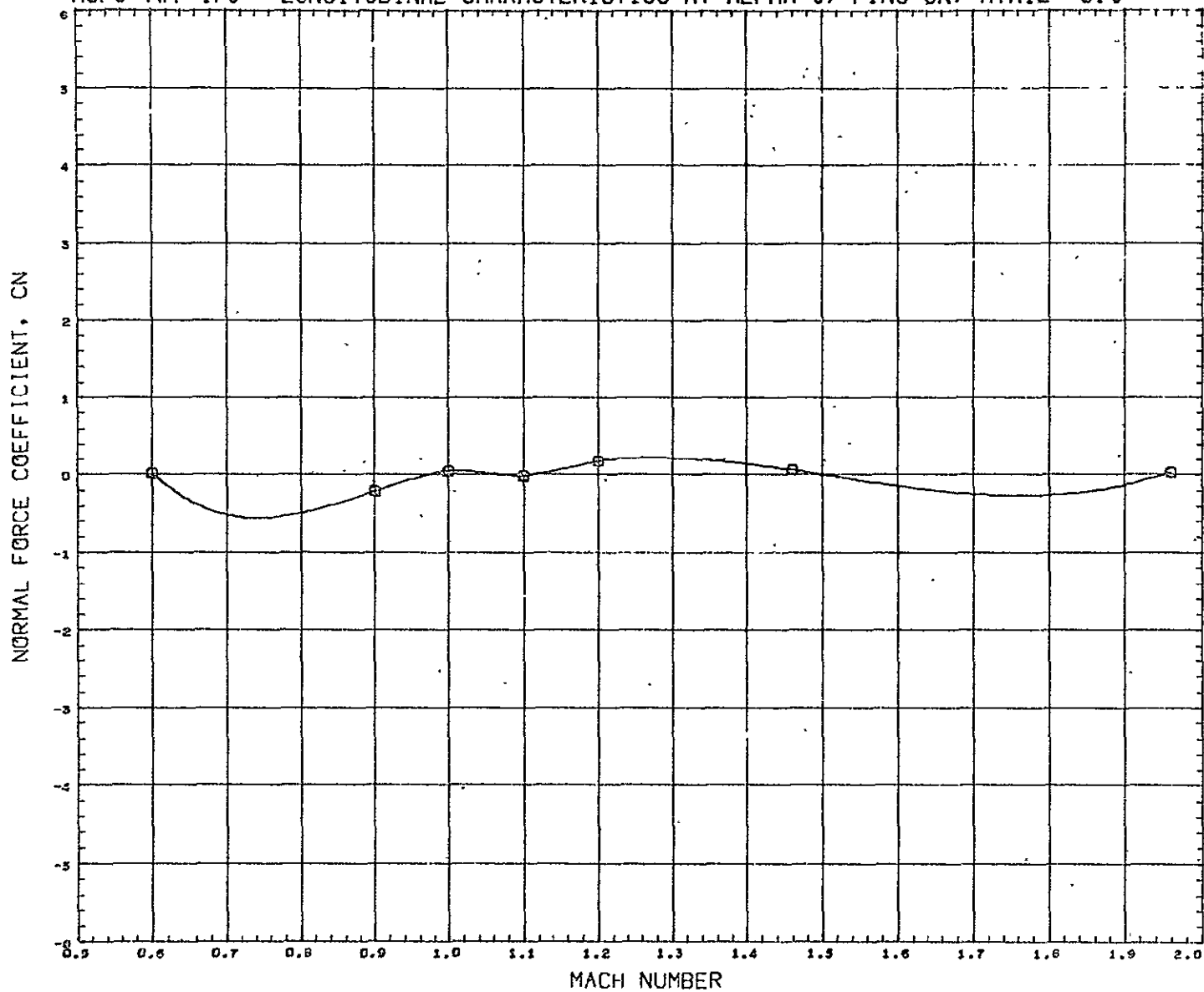
DATA HIST. CODE VI

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS ON, HTAIL=-5.0

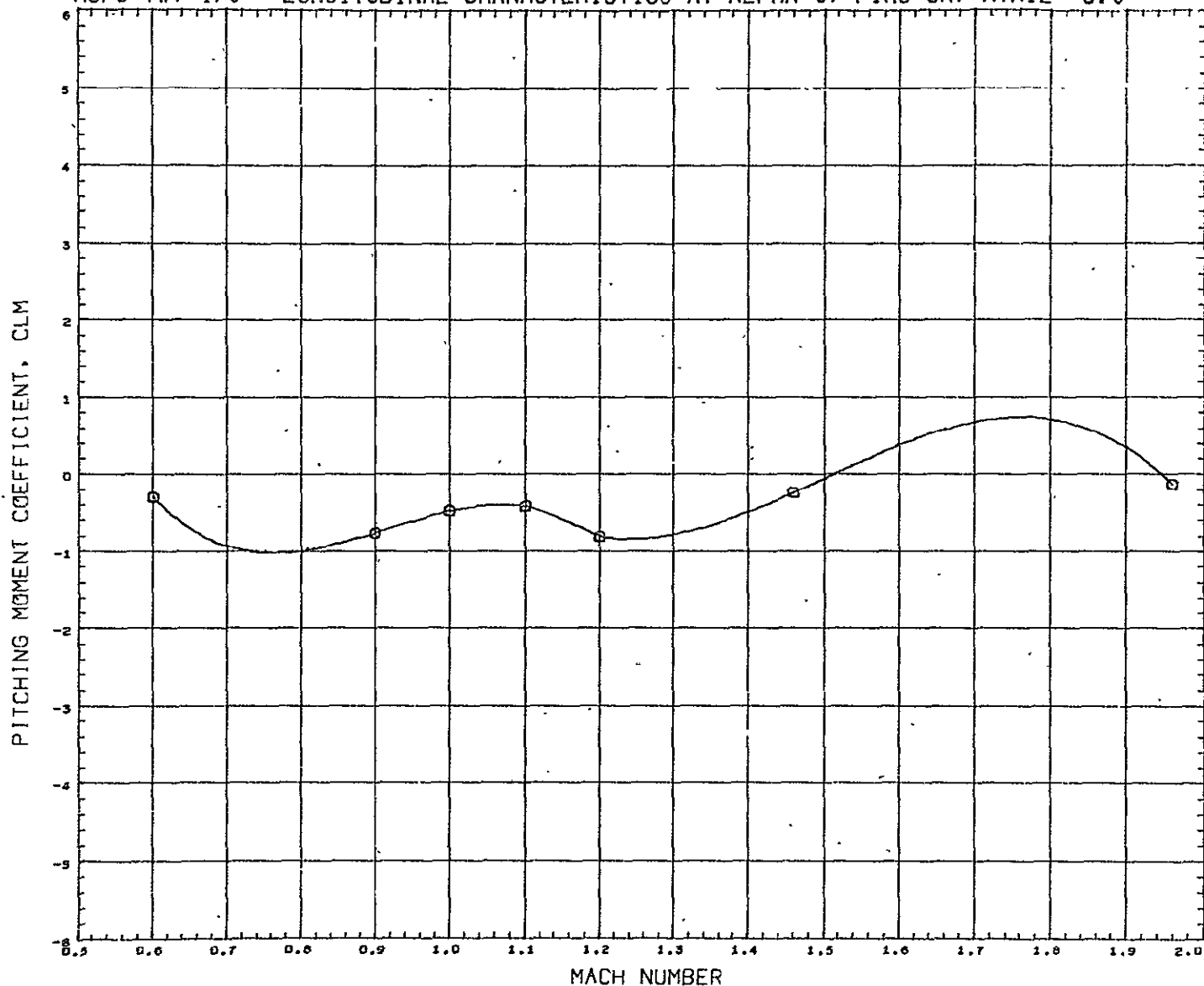


SYMBOL	ALPHA	PARAMETRIC VALUES	
Q	0.000	BETA - 0.020	ORBINC - 1.050
		WINGINC 4.000	HTAIL - 5.000
		PHIB 0.000	

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS ON, HTAIL=-5.0



SYMBOL	ALPHA	PARAMETRIC VALUES			
0	0.000	BETA	- 0.020	ORBINC	- 1.050
		WINGINC	4.000	HTAIL	- 5.000
		PNIB	0.000		

DATA HIST. CODE VI

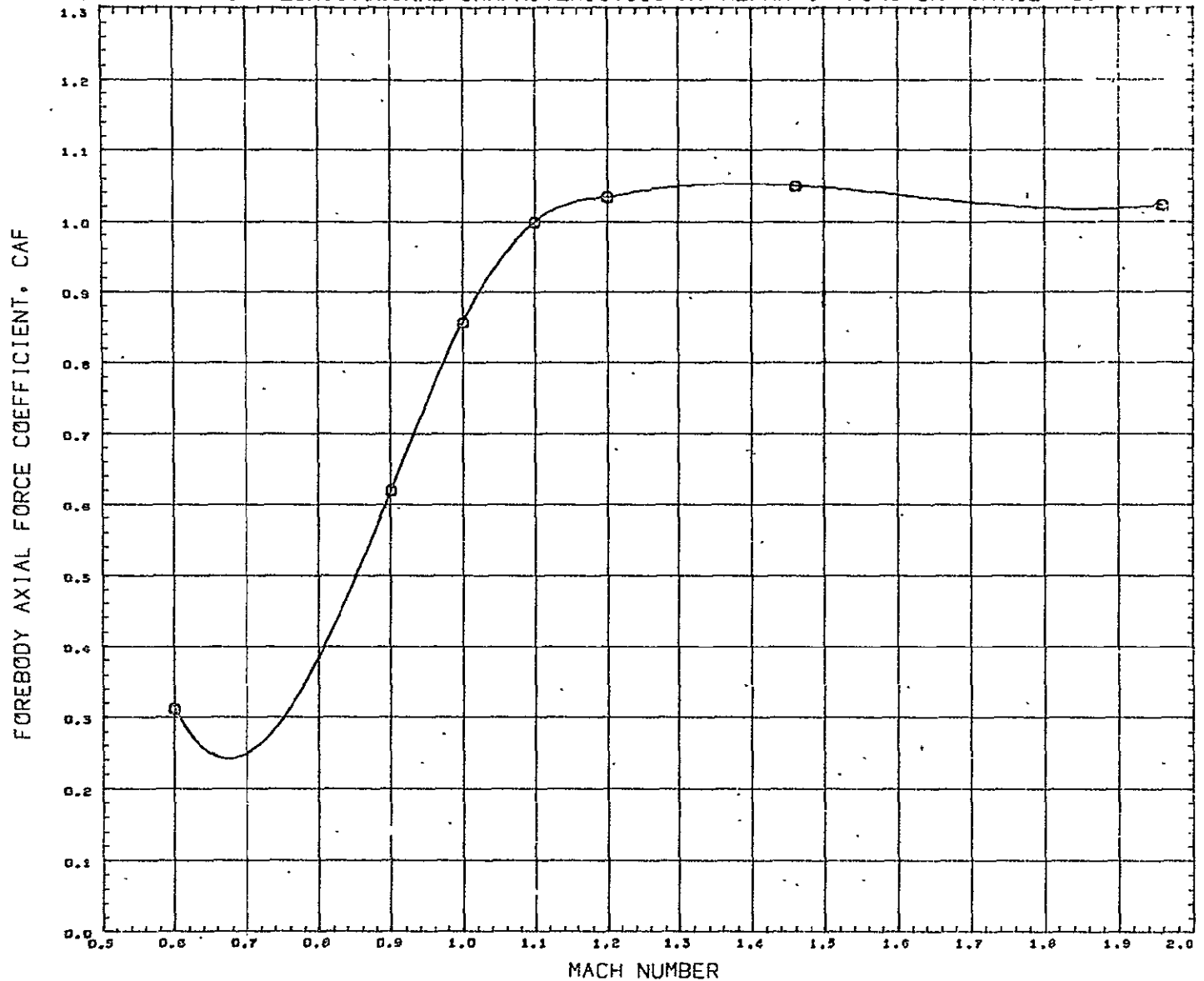
REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, FINS ON, HTAIL=-5.0

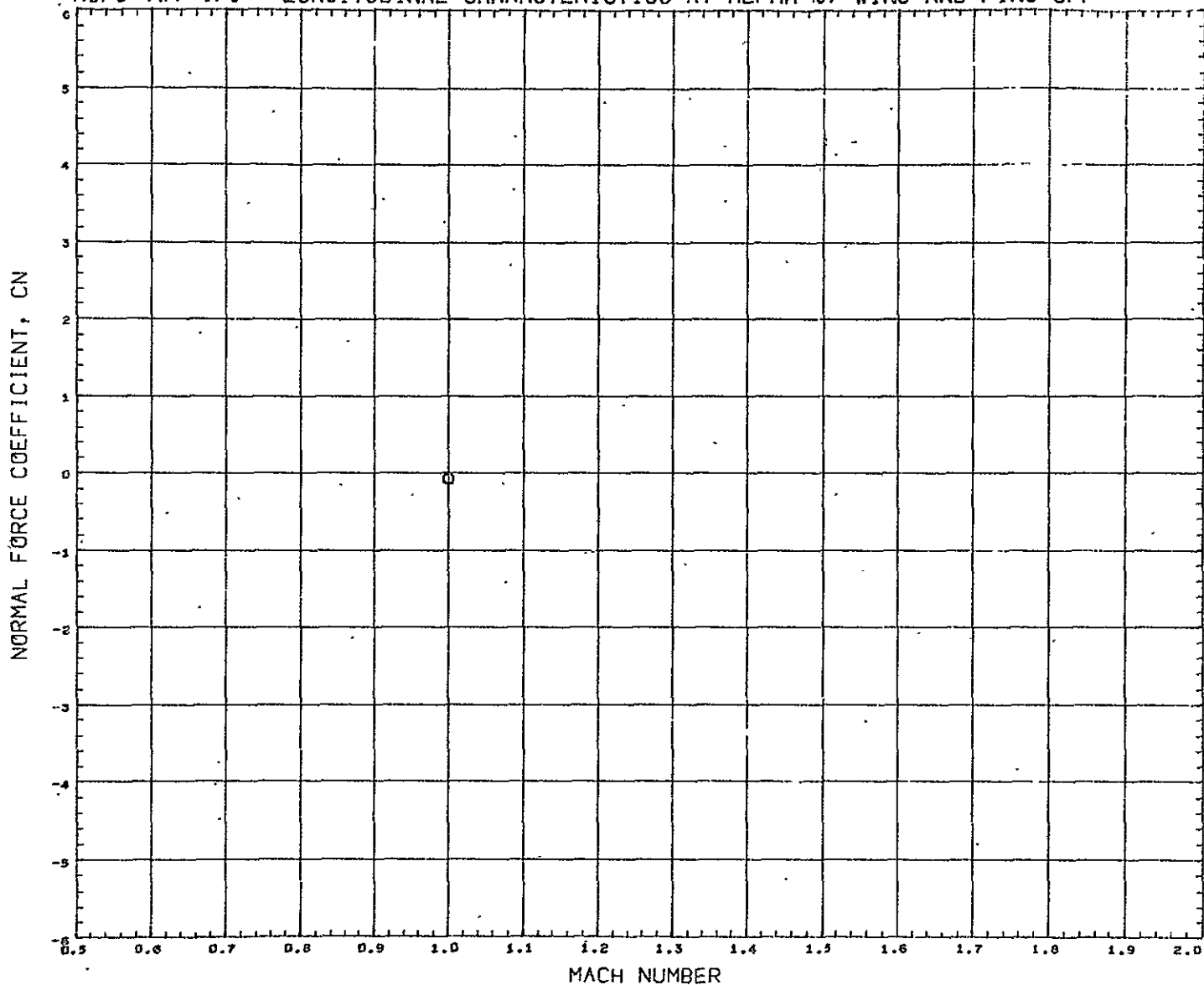


SYMBOL	ALPHA	PARAMETRIC VALUES			
○	0.000	BETA	- 0.020	ORBINC	- 1.050
		WINGINC	4.000	HTAIL	- 5.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	50.1N.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCNT

DATA HIST. CODE VJ

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, WING AND FINS OFF

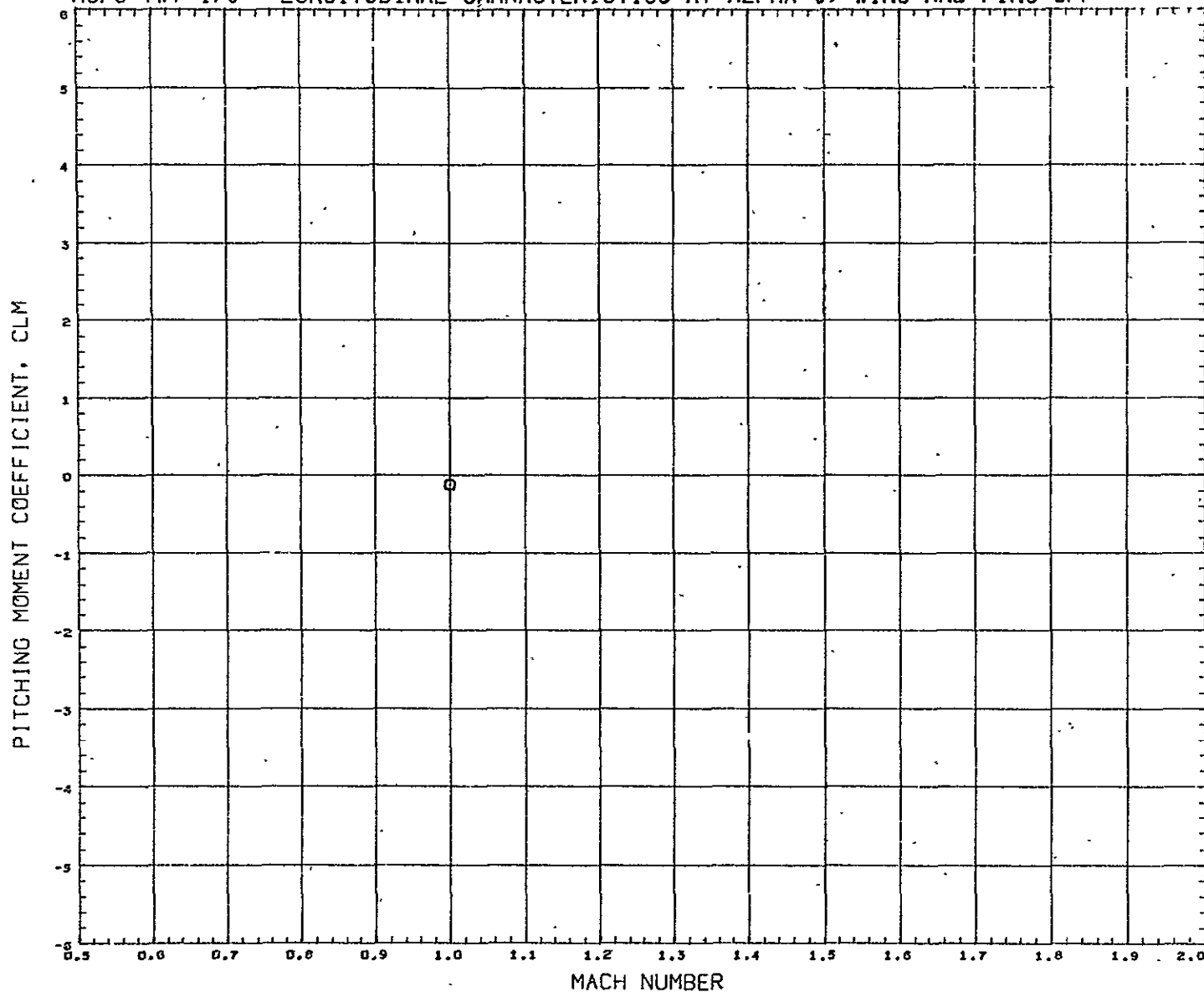


SYMBOL	ALPHA	PARAMETRIC VALUES			
0	0.000	BETA	- 0.100	ORBINC	- 1.050
		HTAIL	0.000	PHIB	0.000

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFD	1.3330	INCHES
XMRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, WING AND FINS OFF

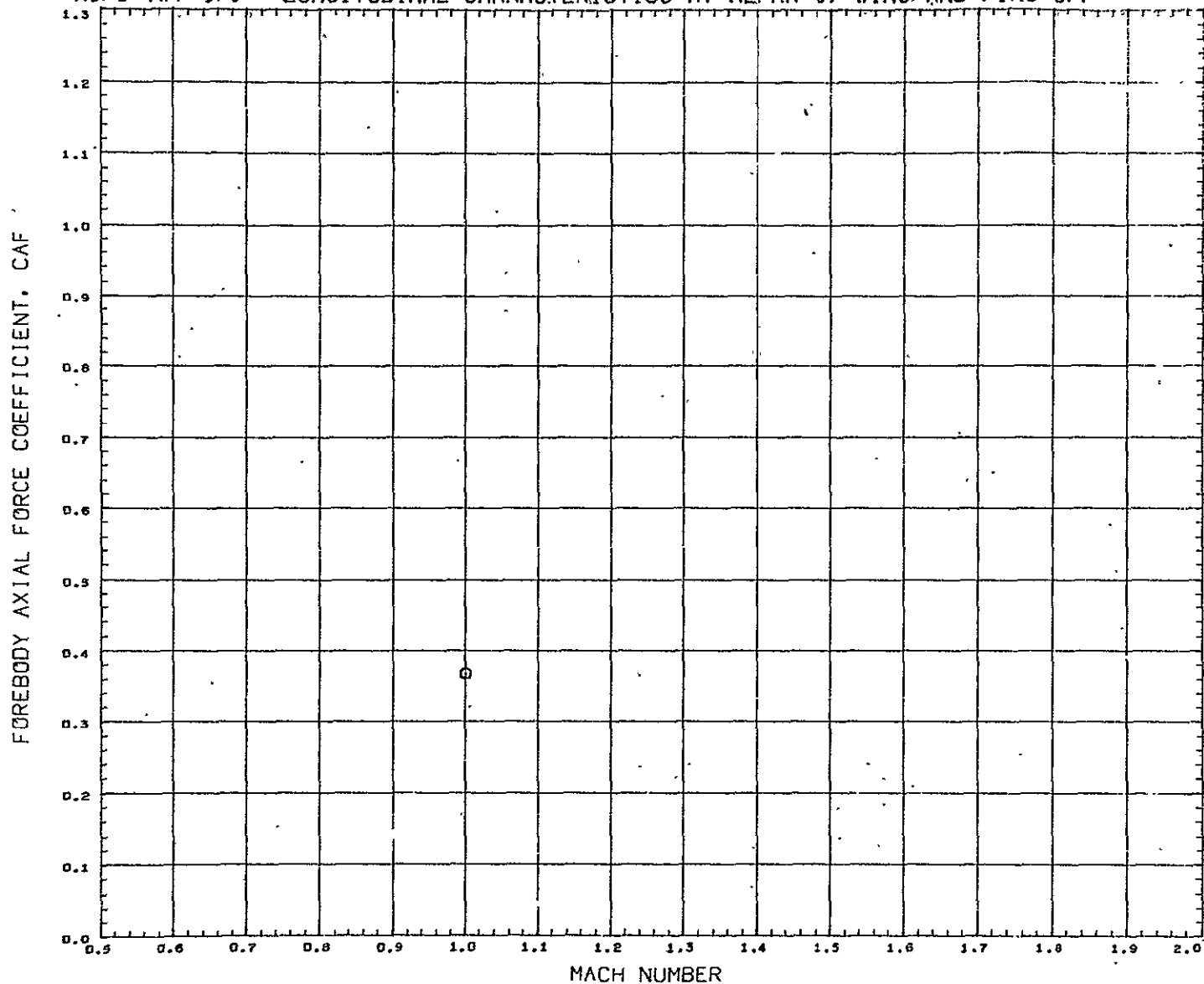


SYMBOL	ALPHA	PARAMETRIC VALUES			
○	0.000	BETA	- 0.100	ORBINC	- 1.050
		MTAIL	0.000	PHIB	0.000

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, WING AND FINS OFF



SYMBOL	ALPHA	PARAMETRIC VALUES			
Q	0.000	BETA	- 0.100	ORBINC	- 1.050
		HTAIL	0.000	PHIB	0.000

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFE	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

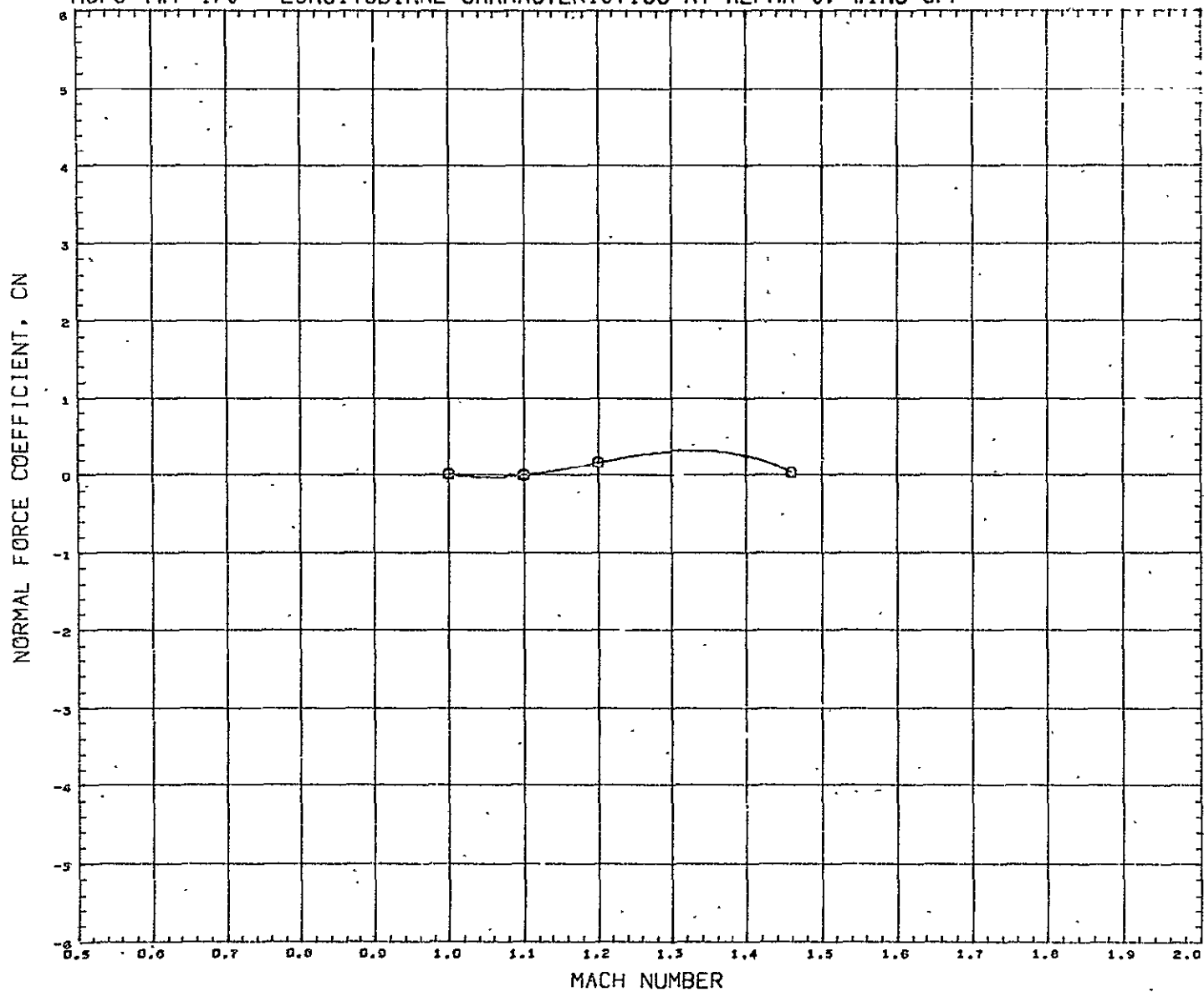
DATA HIST. CODE VI

TWT470 S-IC/GAC ORBITER BOHVS

WING.FINS OFF (H24101) 29 JAN 71

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, WING OFF



SYMBOL	ALPHA	PARAMETRIC VALUES			
□	0.000	BETA	- 0.100	ORBINC	- 1.050
		MTAIL	0.000	PHIB	0.000

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

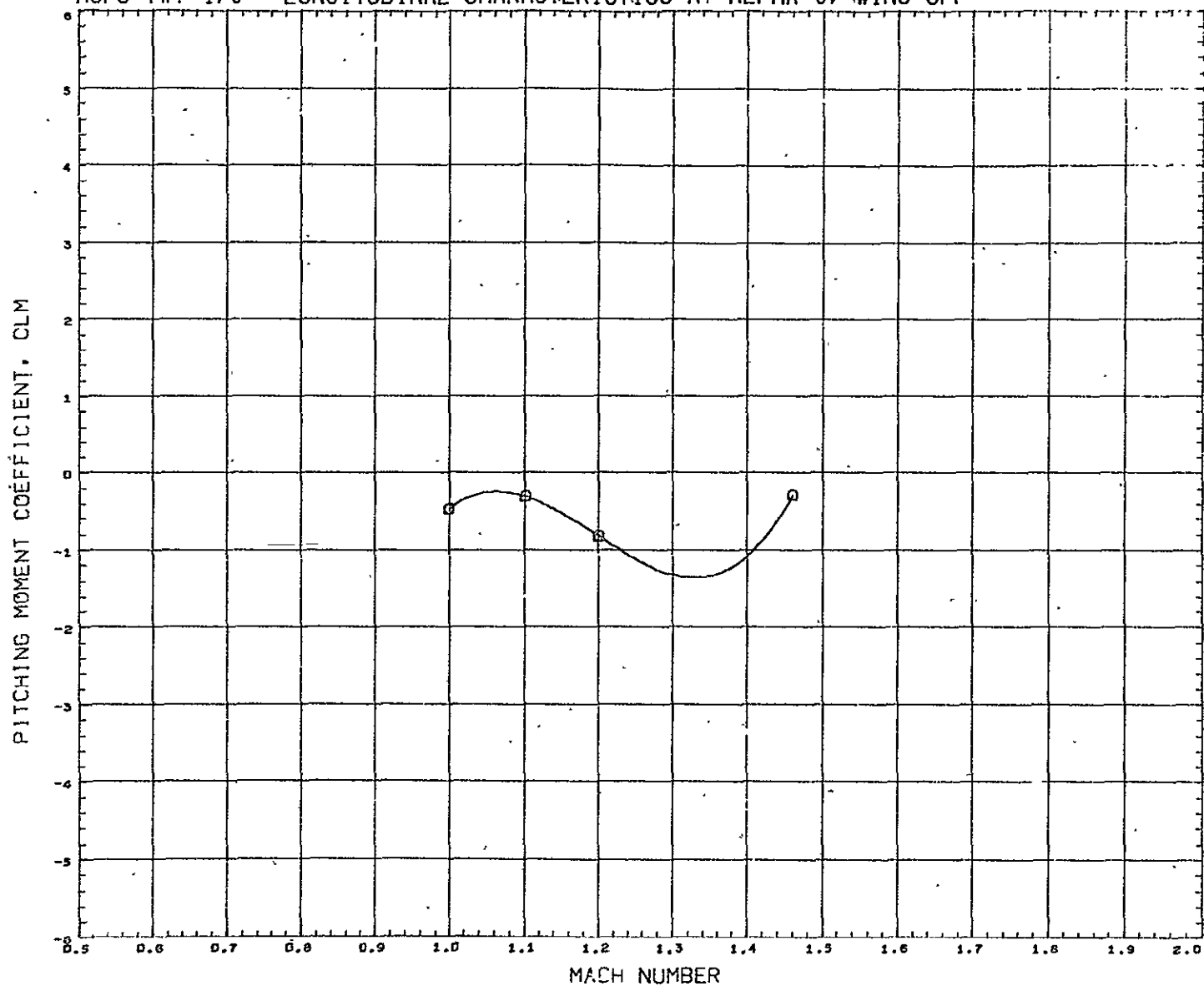
DATA HIST. CODE VI

TWT470 S-IC/GAC ORBITER BF10HVS WING OFF

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, WING OFF



SYMBOL	ALPHA	PARAMETRIC VALUES			
Q	0.000	BETA	- 0.100	ORBINC	- 1.050
		MTAIL	0.000	PHIB	0.000

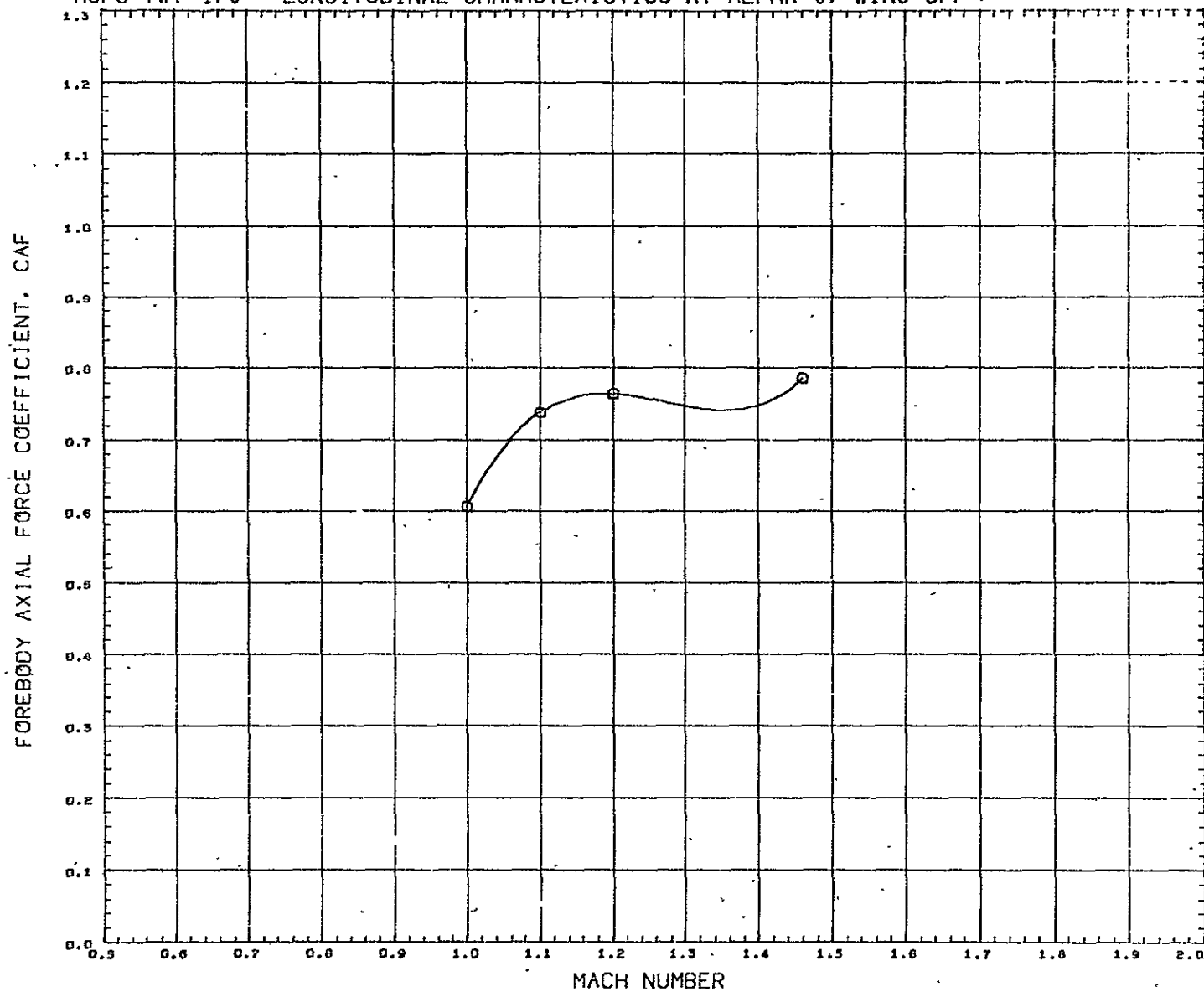
REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

TWT470 S-IC/GAC ORBITER BF10HVS WING OFF

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, WING OFF



SYMBOL	ALPHA	PARAMETRIC VALUES			
Q	0.000	BETA	- 0.100	ORBINC	- 1.050
		HTAIL	0.000	PHIB	0.000

REFERENCE INFORMATION		
REFS	1.3960	Sq. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

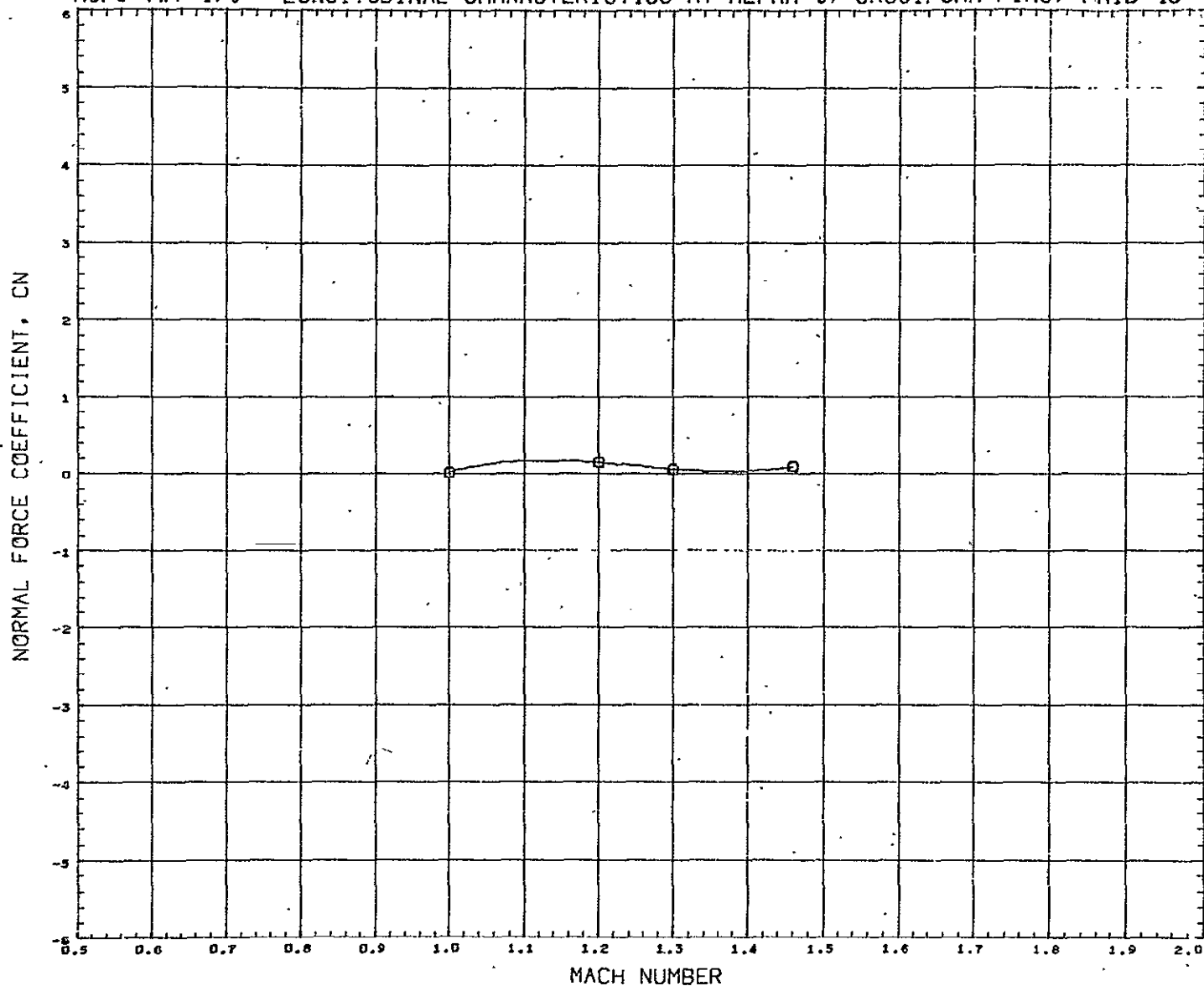
DATA HIST. CODE VJ

TWT470 S-IC/GAC ORBITER BF10HVS WING OFF

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, CRUCIFORM FINS, PHIB=45

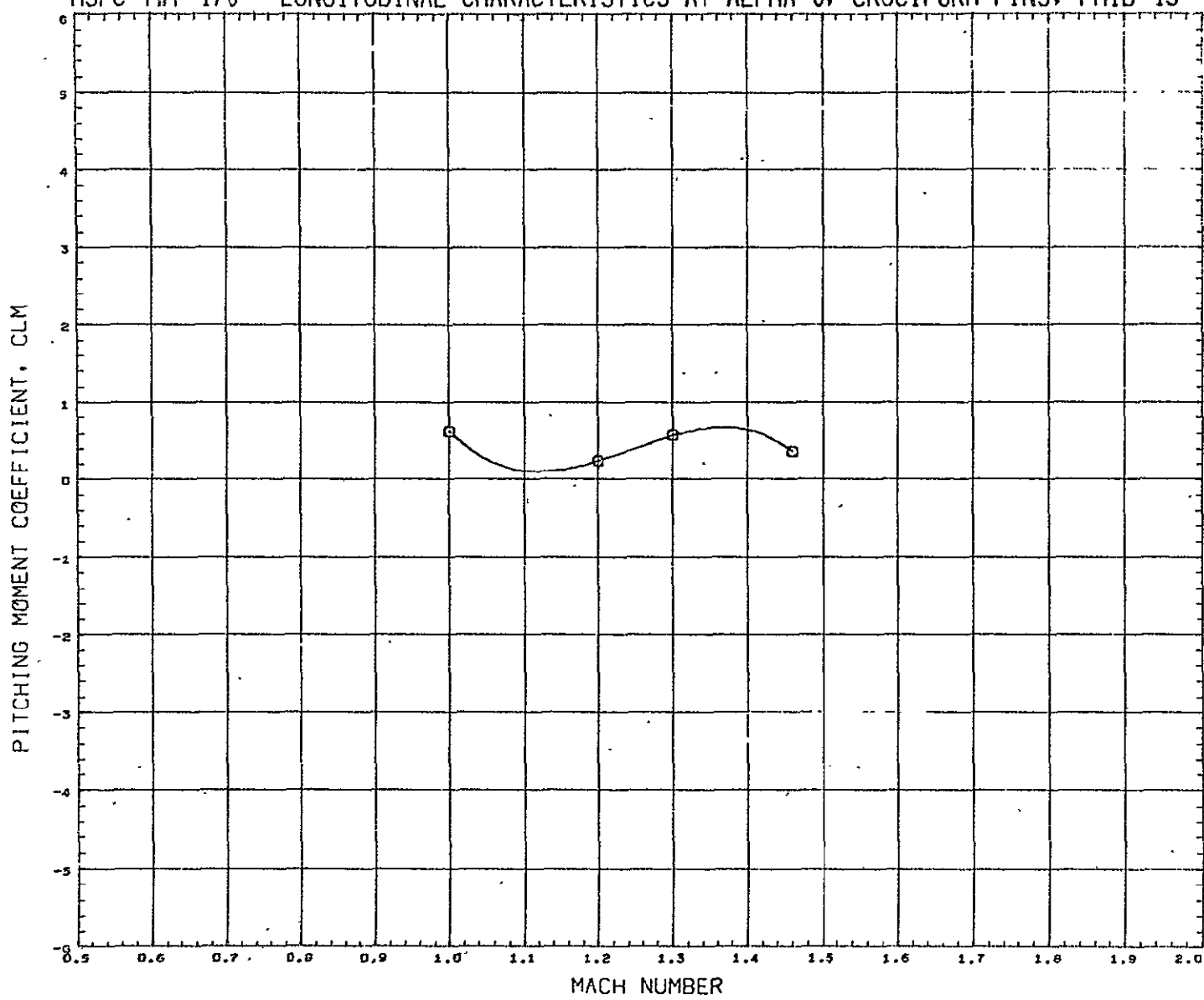


SYMBOL	ALPHA	PARAMETRIC VALUES			
0	0.000	BETA	- 0.070	ORBINC	- 1.050
		WNGINC	4.000	MTAIL	0.000
		PHIB	45.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCNT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, CRUCIFORM FINS, PHIB=45



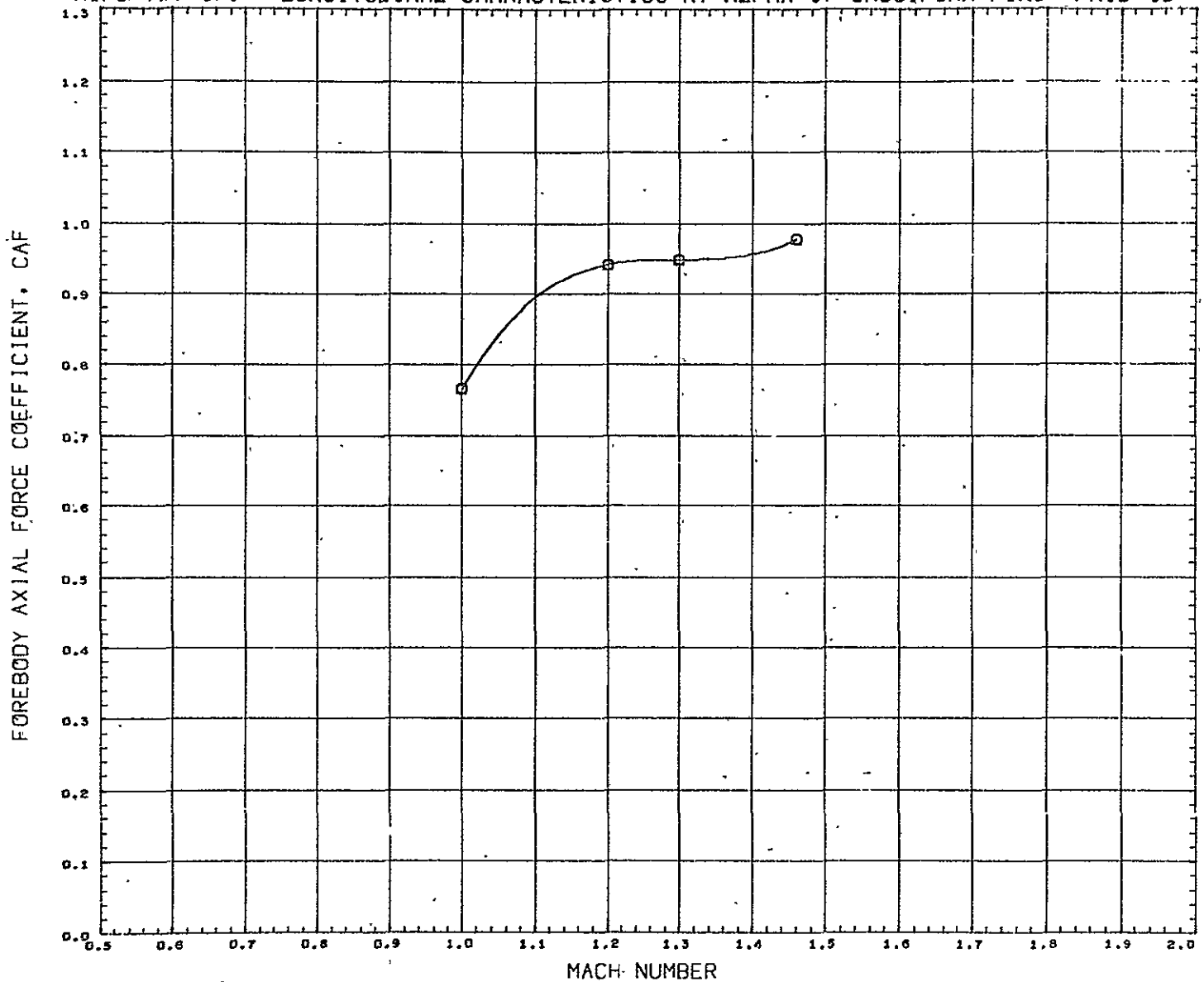
MACH NUMBER

SYMBOL	ALPHA	PARAMETRIC VALUES			
Q	0.000	BETA	- 0.070	ORBINC	- 1.050
		WNGINC	4.000	HTAIL	0.000
		PHIB	45.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3530	INCHES
REFB	1.3530	INCHES
XMRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0; CRUCIFORM FINS, PHIB=45

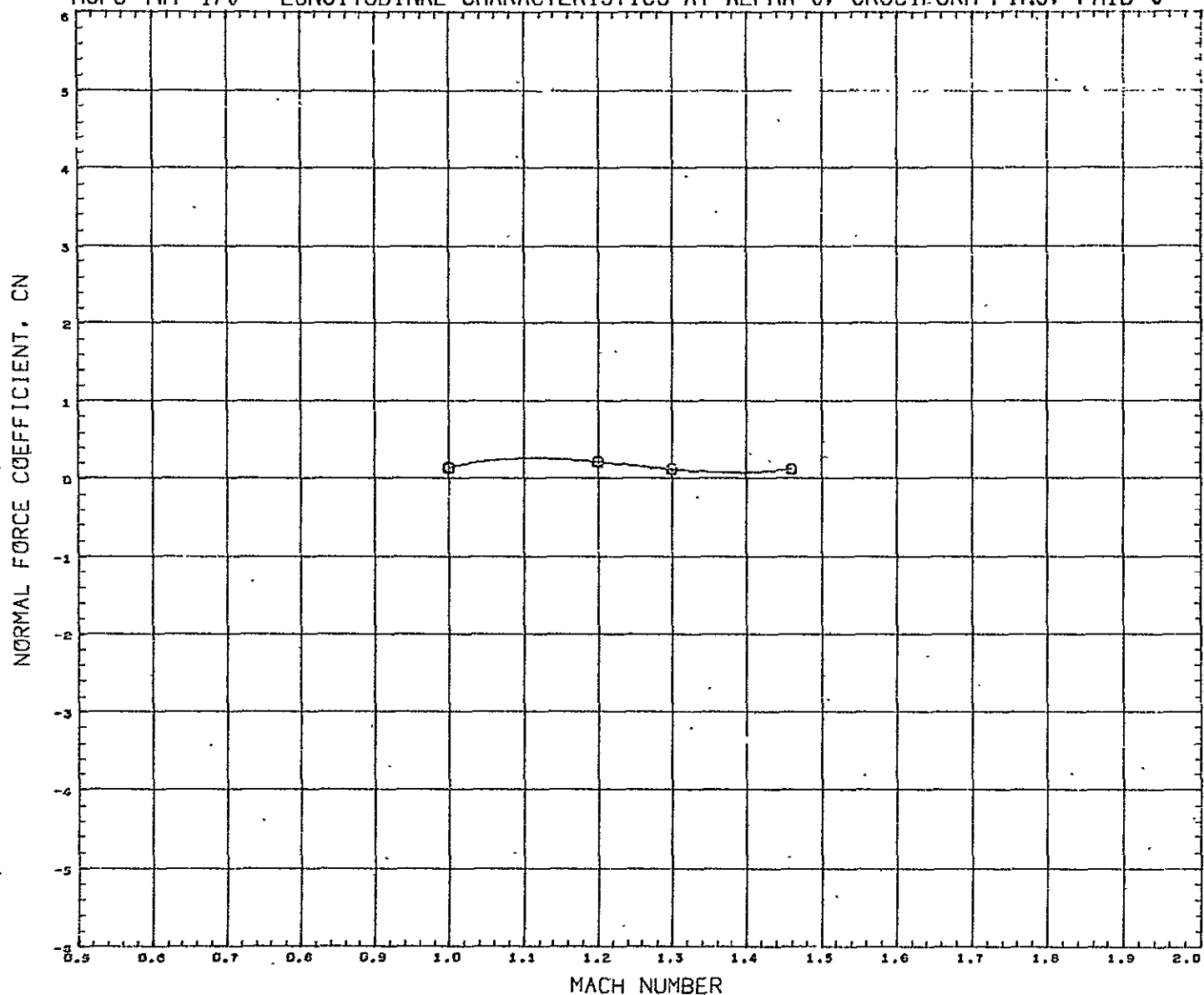


SYMBOL	ALPHA	PARAMETRIC VALUES			
□	0.000	BETA	- 0.070	ORGINC	- 1.050
		WINGINC	4.000	HTAIL	0.000
		PHIB	45.000		

REFERENCE INFORMATION		
REFS	1.3960	50. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, CRUCIFORM FINS, PHIB=0

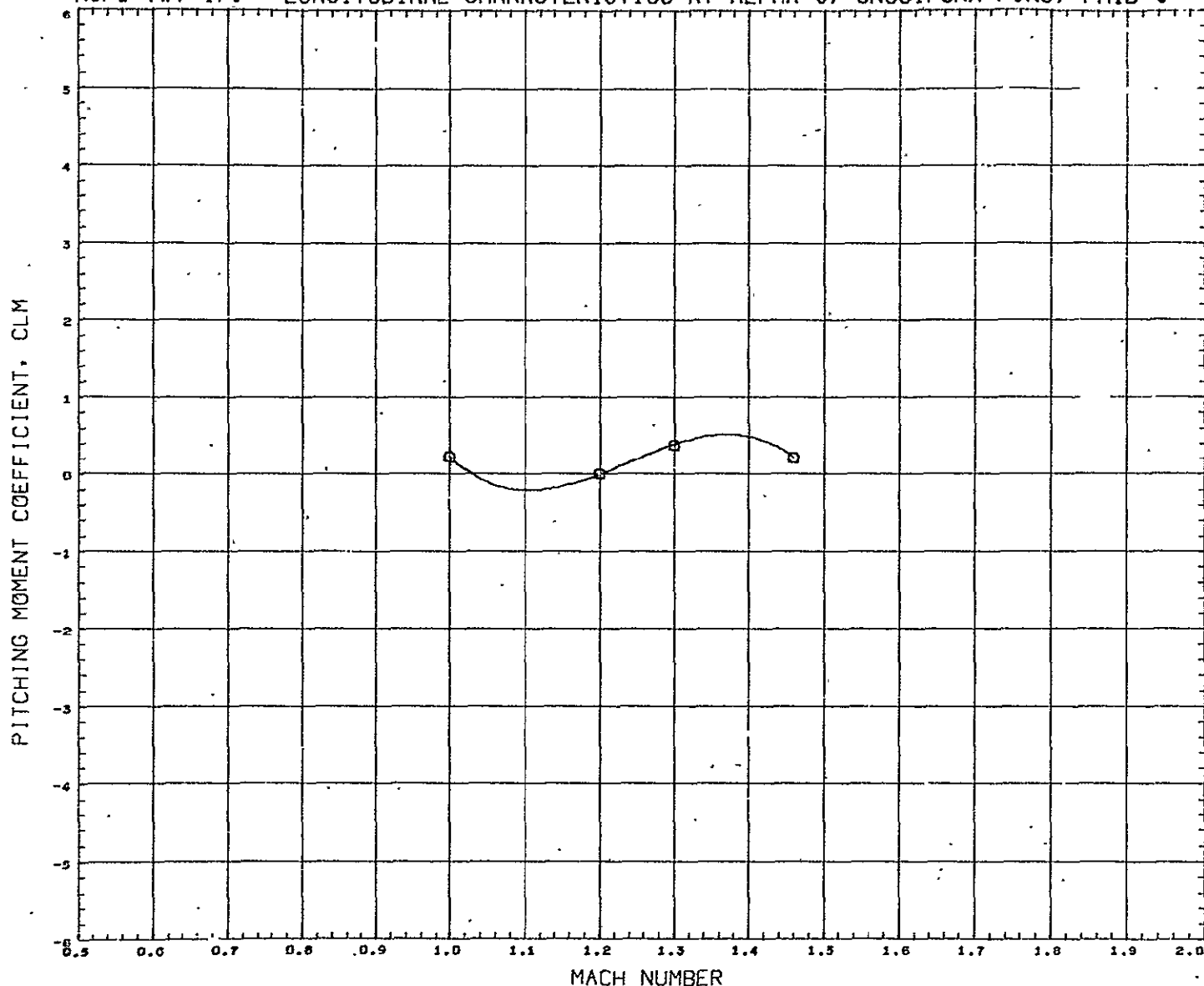


SYMBOL ALPHA PARAMETRIC VALUES
 O 0.000 BETA - 0.060 ORBINC - 1.050
 WINGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, CRUCIFORM FINS, PHIB=0



SYMBOL	ALPHA	PARAMETRIC VALUES	
Q	0.000	BETA - 0.060	ORBINC - 1.050
		WHGINC 4.000	HTAIL 0.000
		PHIB 0.000	

REFERENCE INFORMATION		
REFS	1.3960	50. IN.
REFL	1.3330	INCHES
REFD	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

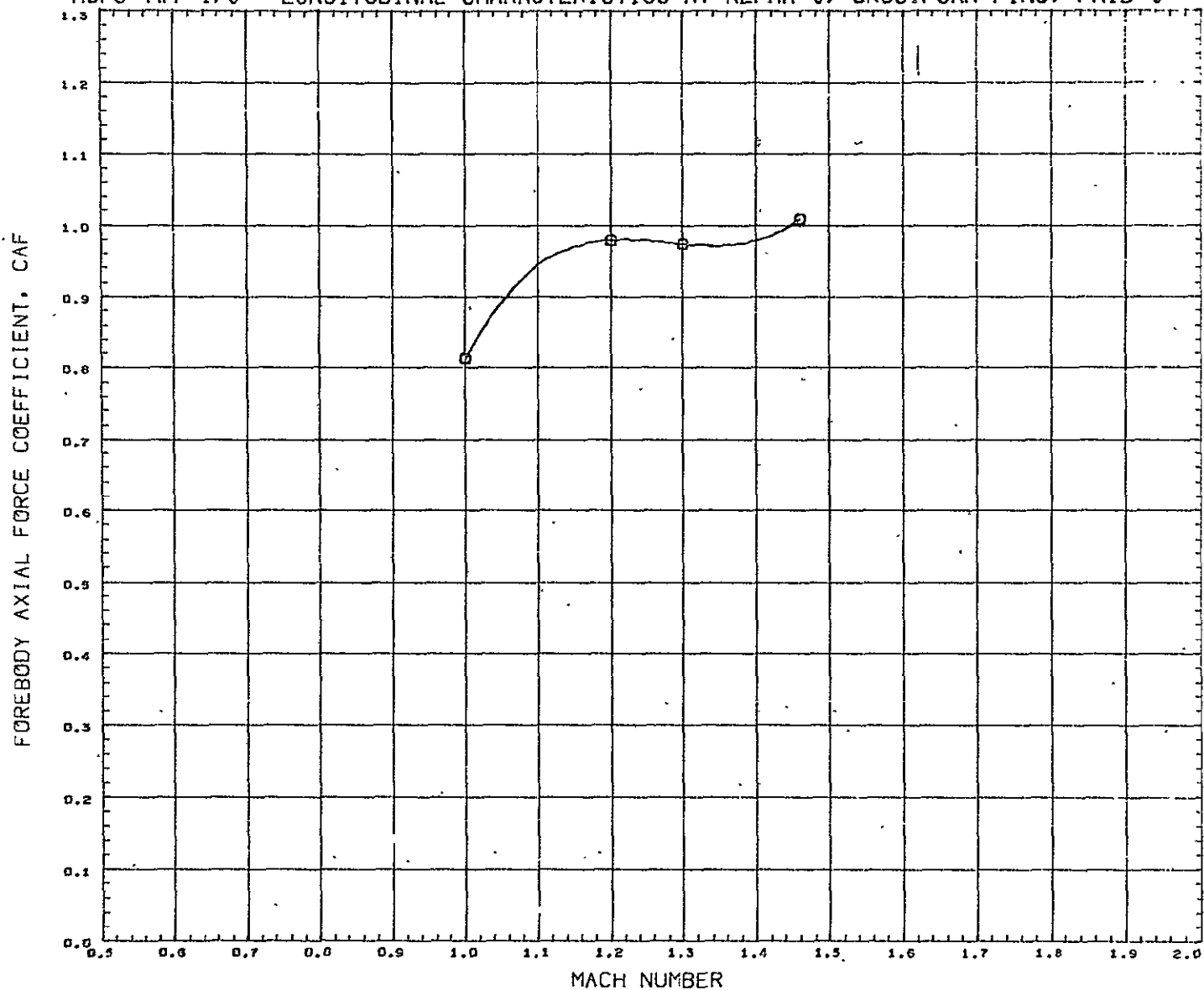
DATA HIST. CODE VI

TWT470 S-IC/GAC ORBITER BF20WHVS PHIB = 0

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MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, CRUCIFORM FINS, PHIB=0

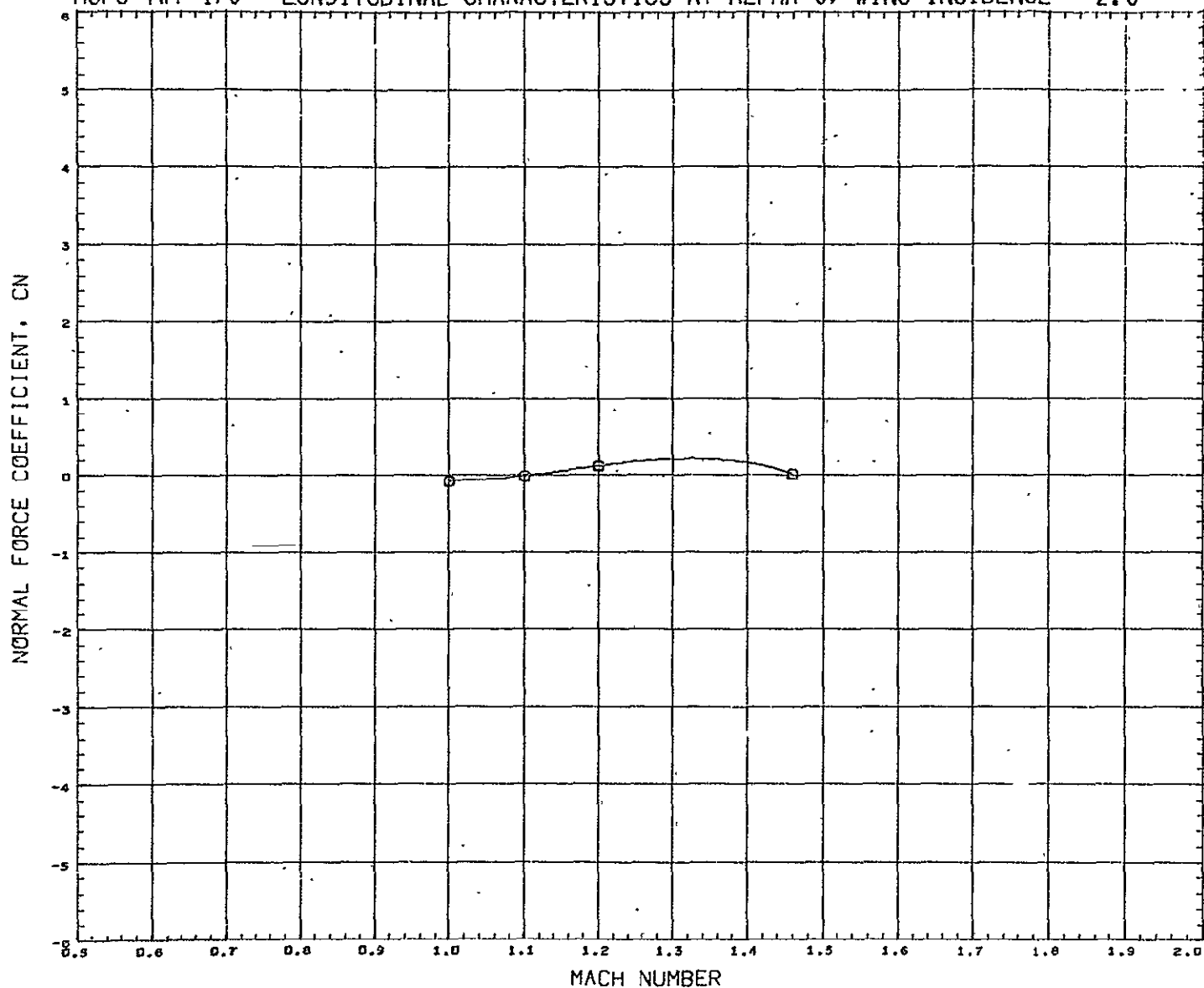


SYMBOL	ALPHA	PARAMETRIC VALUES			
Q	0.000	DETA	- 0.000	ORBINC	- 1.050
		WNGINC	4.000	HTAIL	0.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, WING INCIDENCE = 2.0

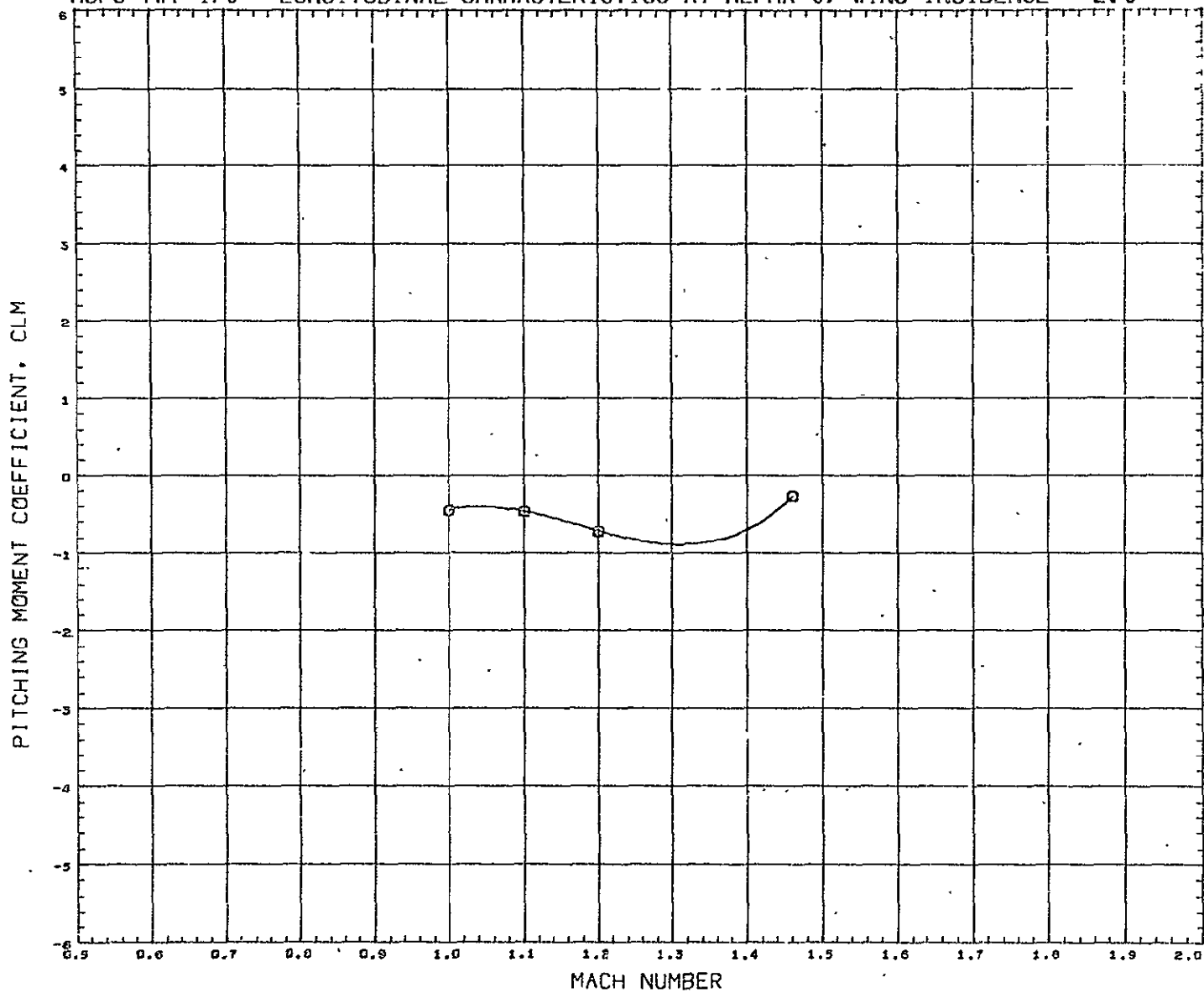


SYMBOL	ALPHA	PARAMETRIC VALUES			
Q	0.000	BETA	- 0.090	ORBINC	- 1.050
		WNGINC	2.000	MTAIL	0.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, WING INCIDENCE = 2.0

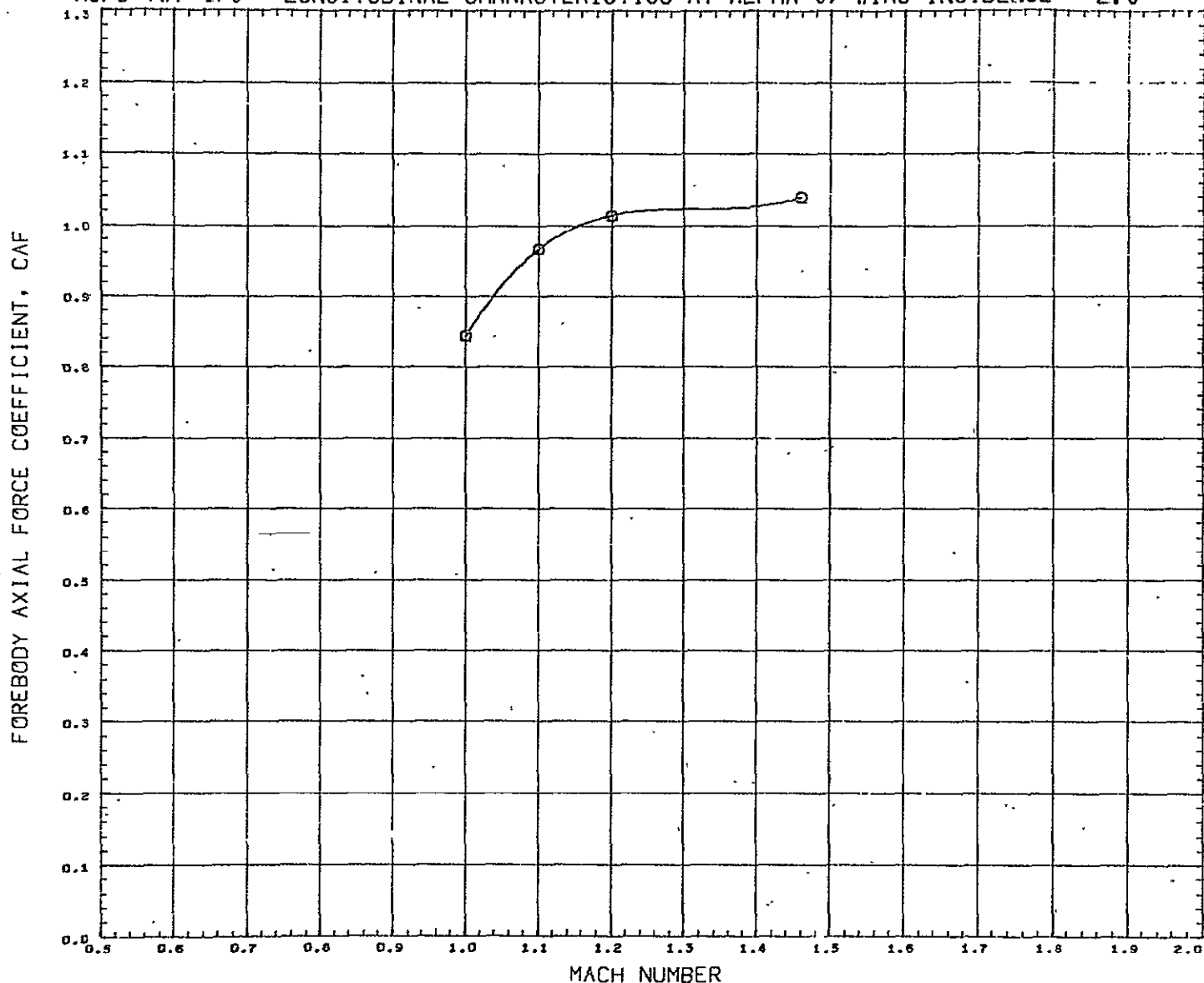


SYMBOL	ALPHA	PARAMETRIC VALUES			
Q	0.000	BETA	- 0.000	ORDINC	- 1.000
		WNGINC	2.000	HTAIL	0.000
		PHID	0.000		

DATA HIST. CODE V1

REFERENCE INFORMATION		
REFS	1.3960	SG. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, WING INCIDENCE = 2.0

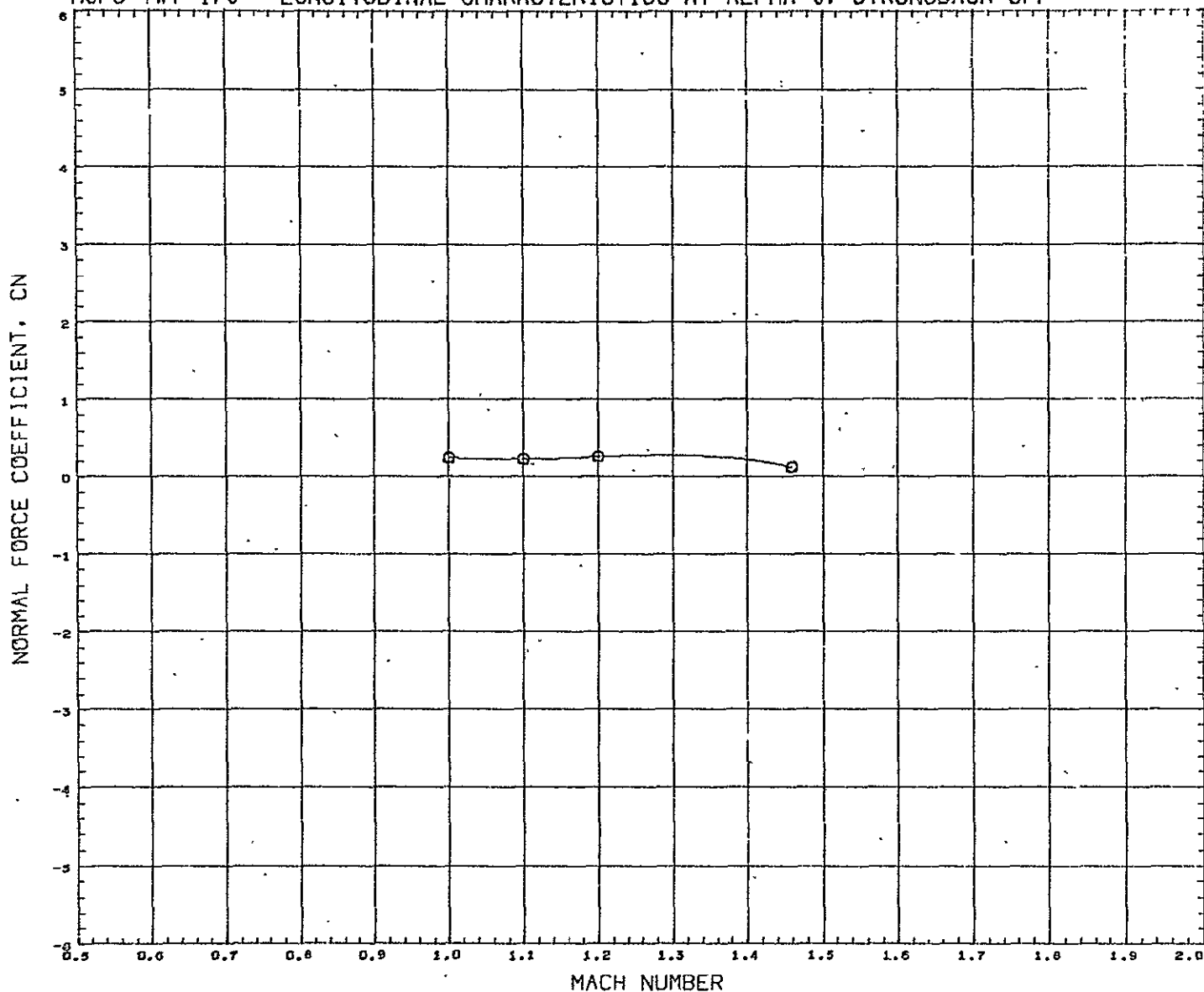


SYMBOL	ALPHA	PARAMETRIC VALUES			
□	0.000	BETA	- 0.090	ORBINC	- 1.050
		WINGINC	2.000	HTAIL	0.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, STRONGBACK OFF

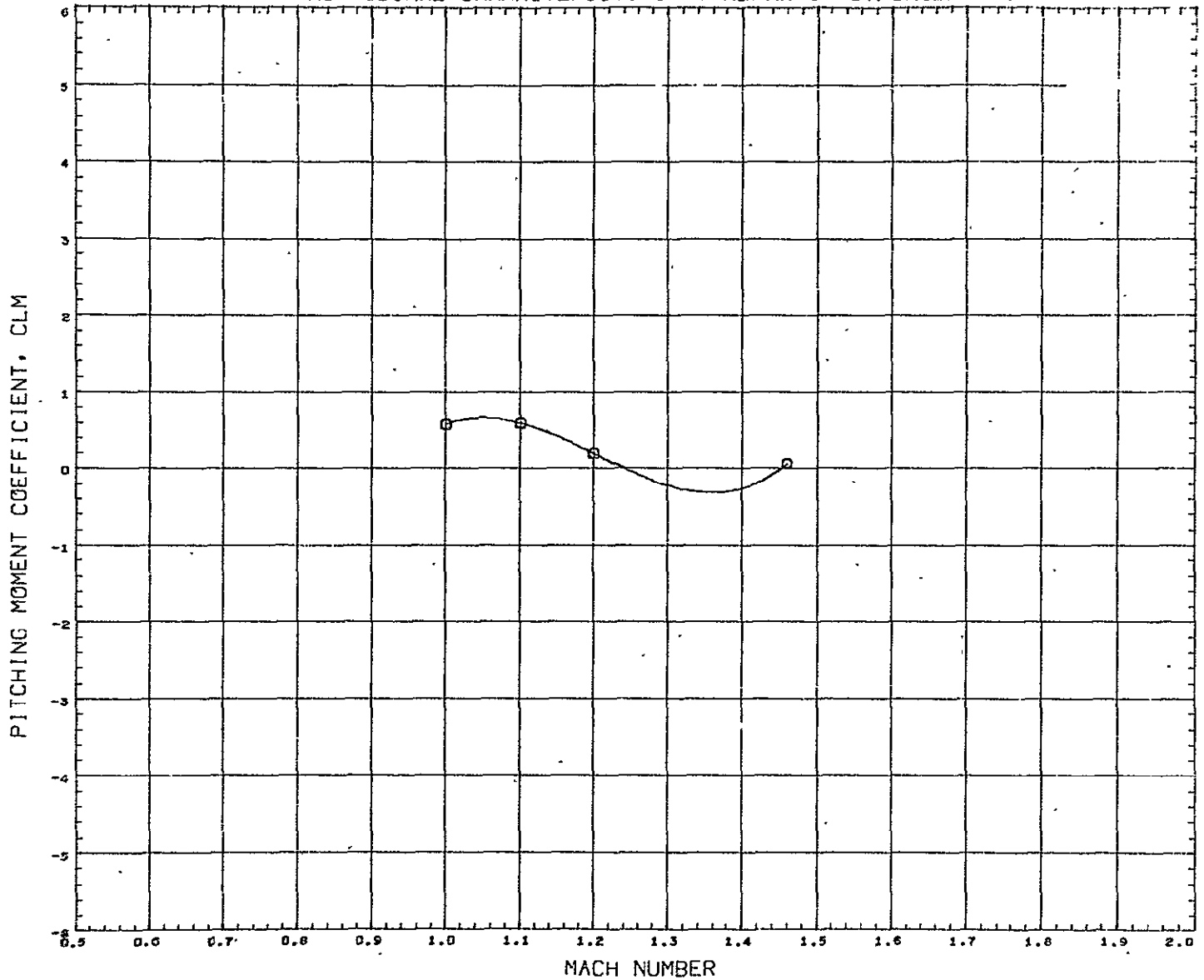


SYMBOL	ALPHA	PARAMETRIC VALUES			
○	0.000	BETA	- 0.040	ORGINC	- 1.050
		WINGINC	4.000	HTAIL	0.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, STRONGBACK OFF

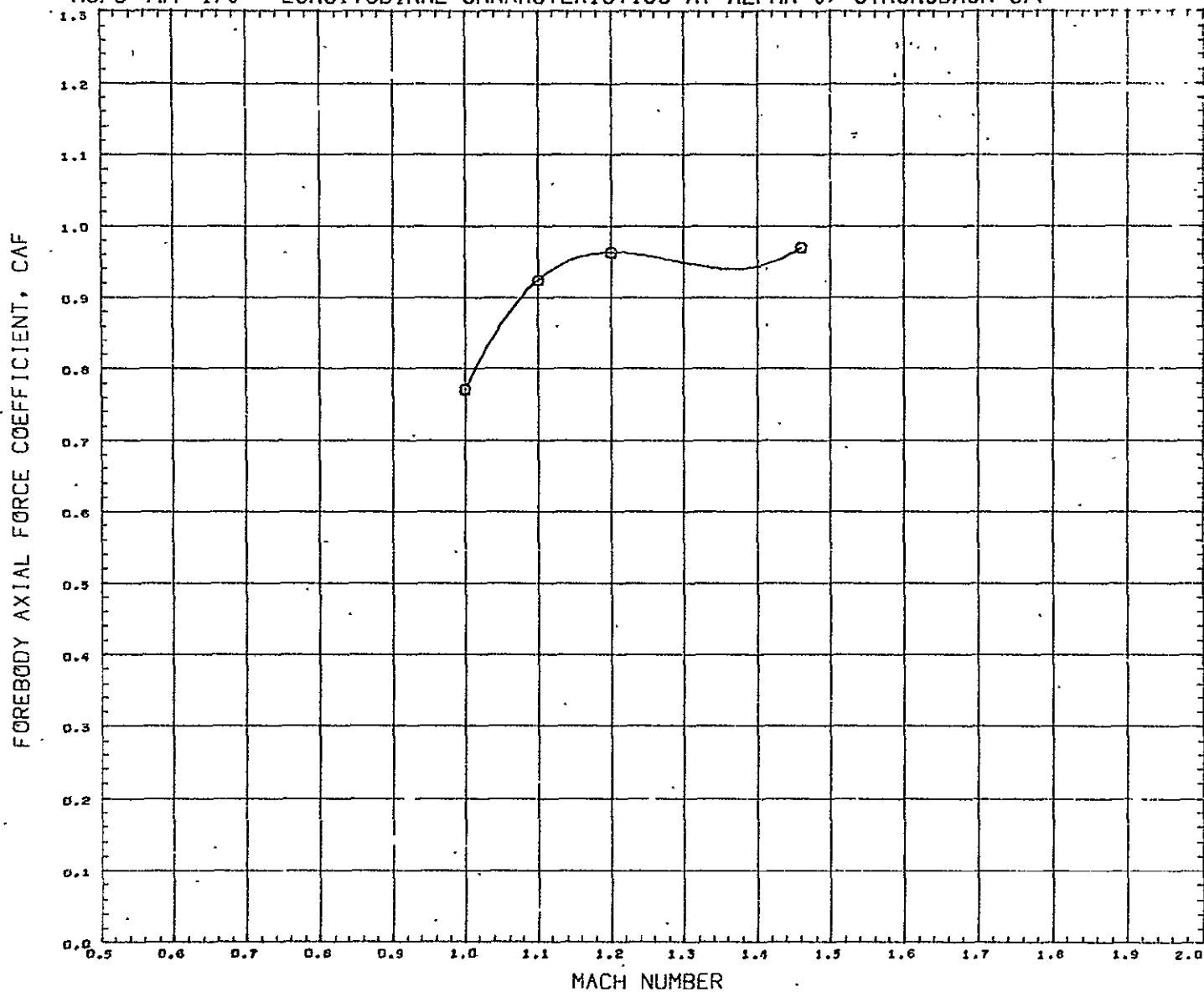


SYMBOL	ALPHA	PARAMETRIC VALUES			
Q	0.000	BETA	- 0.040	ORBINC	- 1.050
		WINGINC	4.000	HTAIL	0.000
		PHIB.	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, STRONGBACK OFF

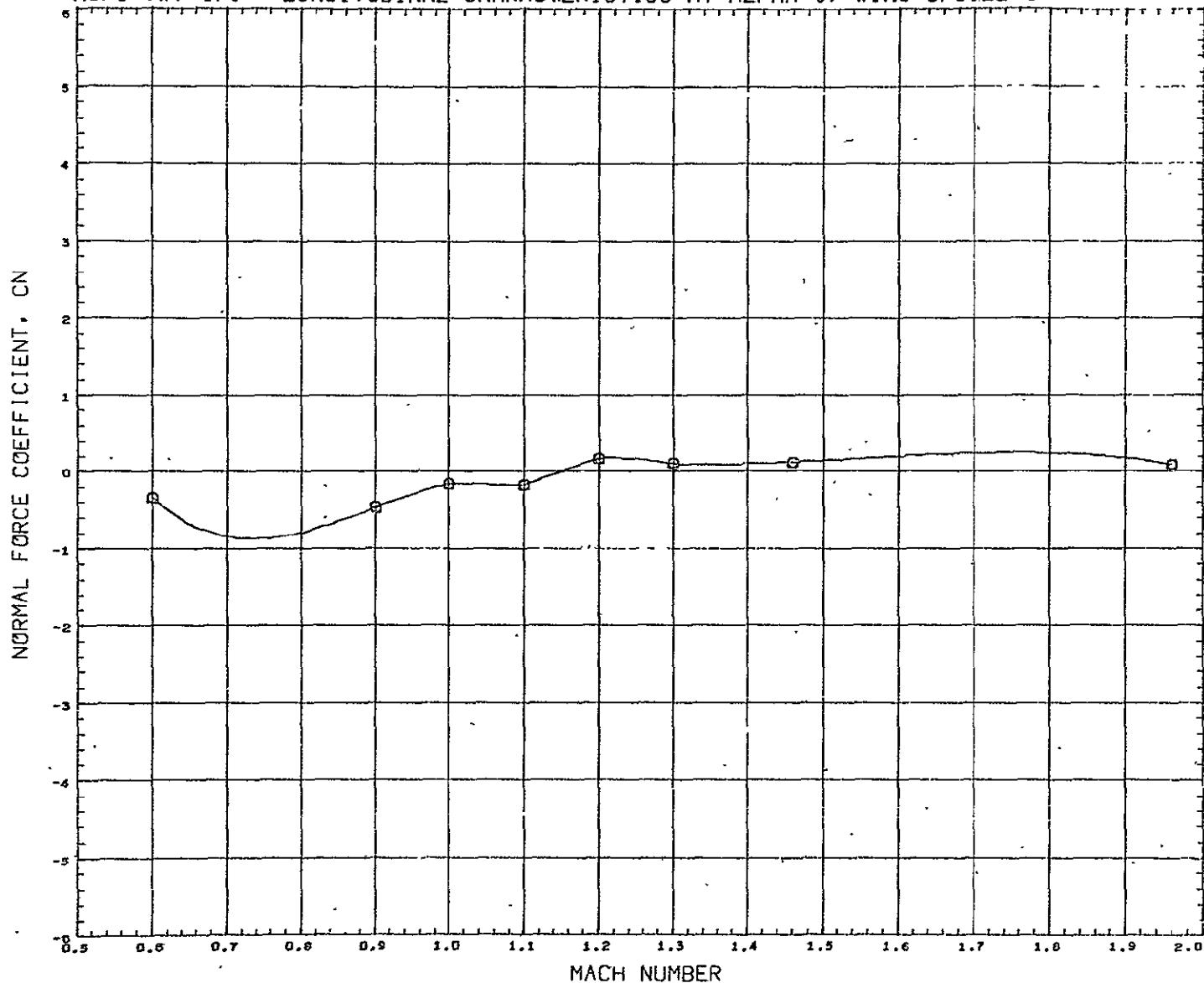


SYMBOL	ALPHA	PARAMETRIC VALUES			
□	0.000	BETA	- 0.040	ORBINC	- 1.050
		WINGINC	4.000	HTAIL	0.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SO. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, WING SPOILERS

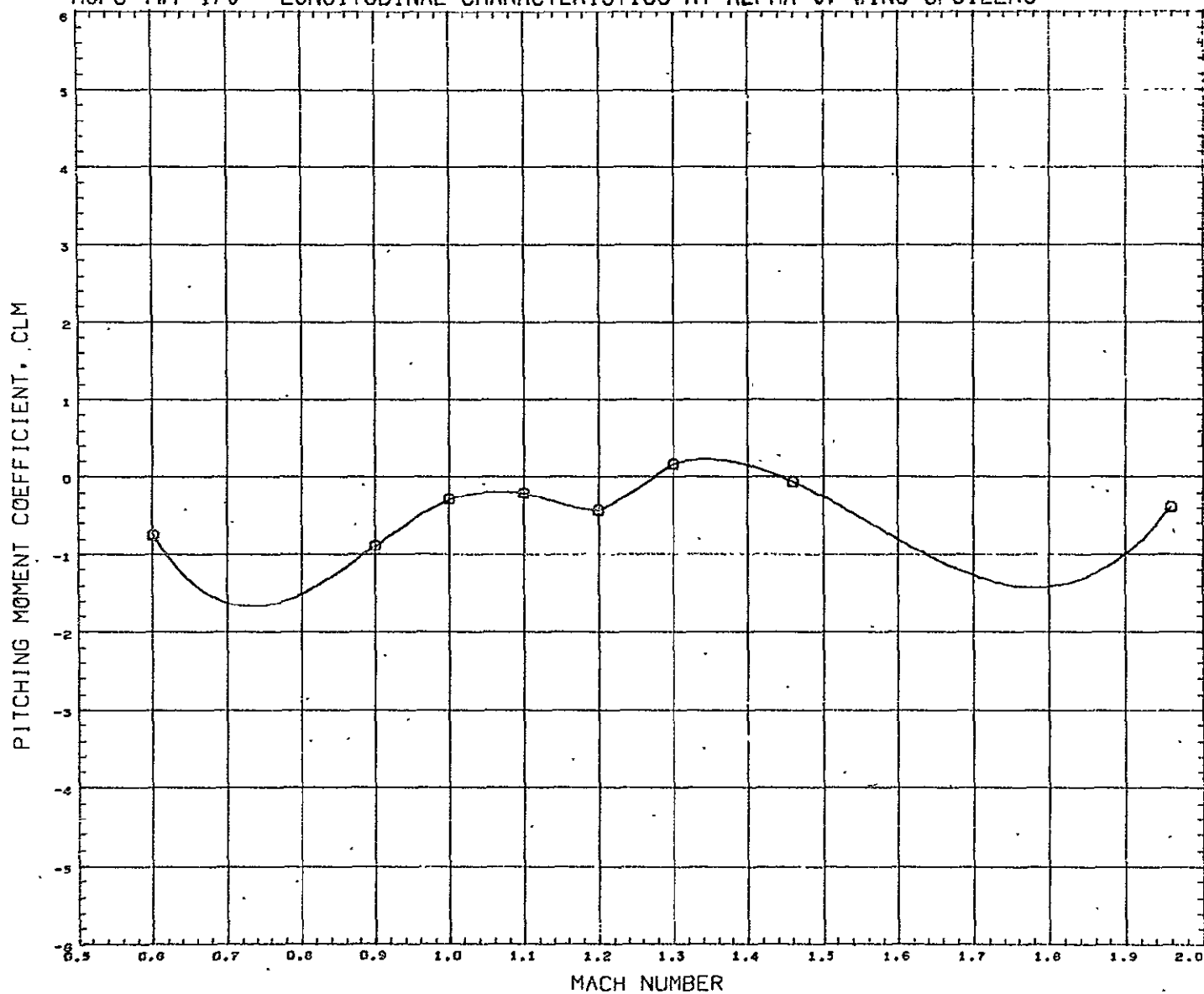


SYMBOL	ALPHA	PARAMETRIC VALUES			
□	0.000	BETA	- 0.050	ORBINC	- 1.050
		WINGINC	4.000	MTAIL	0.000
		PMIB	0.000		

DATA HIST. CODE VI

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRF	5.2640	INCHES
YNRF	0.0000	INCHES
ZNRF	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, WING SPOILERS

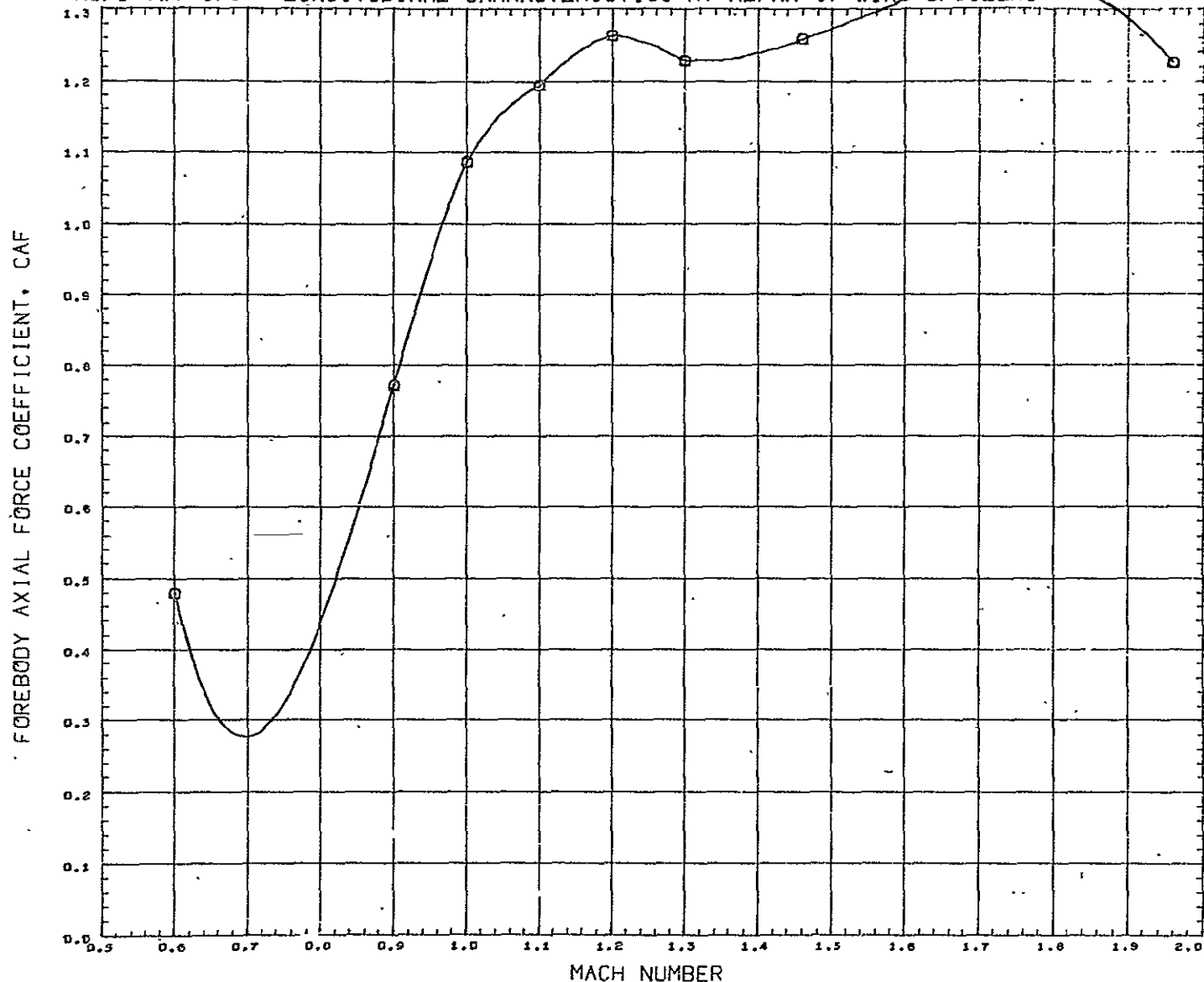


SYMBOL	ALPHA	PARAMETRIC VALUES			
□	0.000	BETA	- 0.050	ORBINC	- 1.050
		WNGINC	4.000	HTAIL	0.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE VI

MSFC TWT 470 LONGITUDINAL CHARACTERISTICS AT ALPHA=0, WING SPOILERS



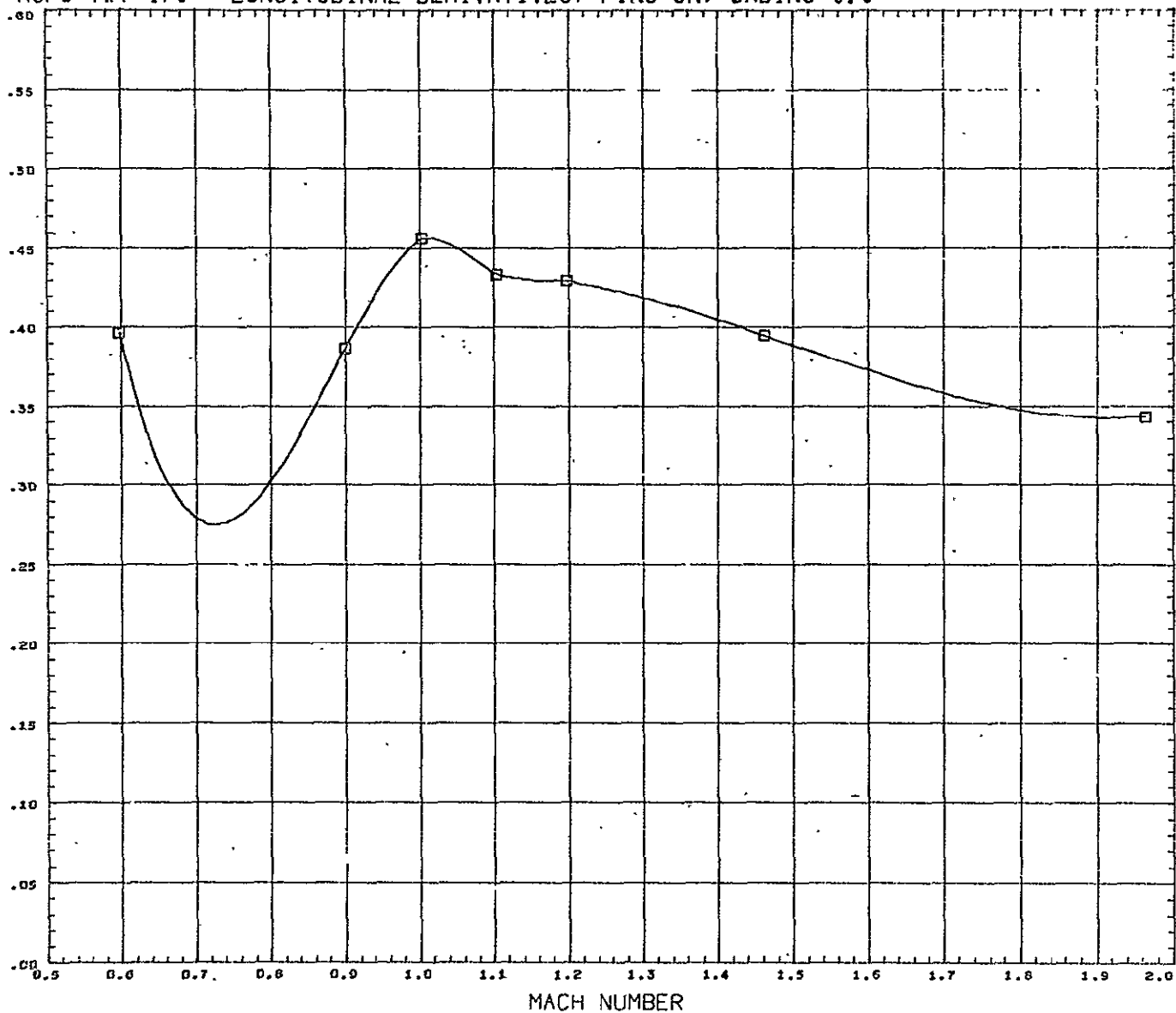
SYMBOL	ALPHA	PARAMETRIC VALUES			
Q	0.000	BETA	- 0.050	ORBINC	- 1.050
		WNGINC	4.000	HTAIL	0.000
		PHIB	0.000		

DATA HIST. CODE VI

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS ON, ORBINC=0.0

NORMAL FORCE DERIVATIVE, $D(CN)/D(\alpha)$ PER DEGREE

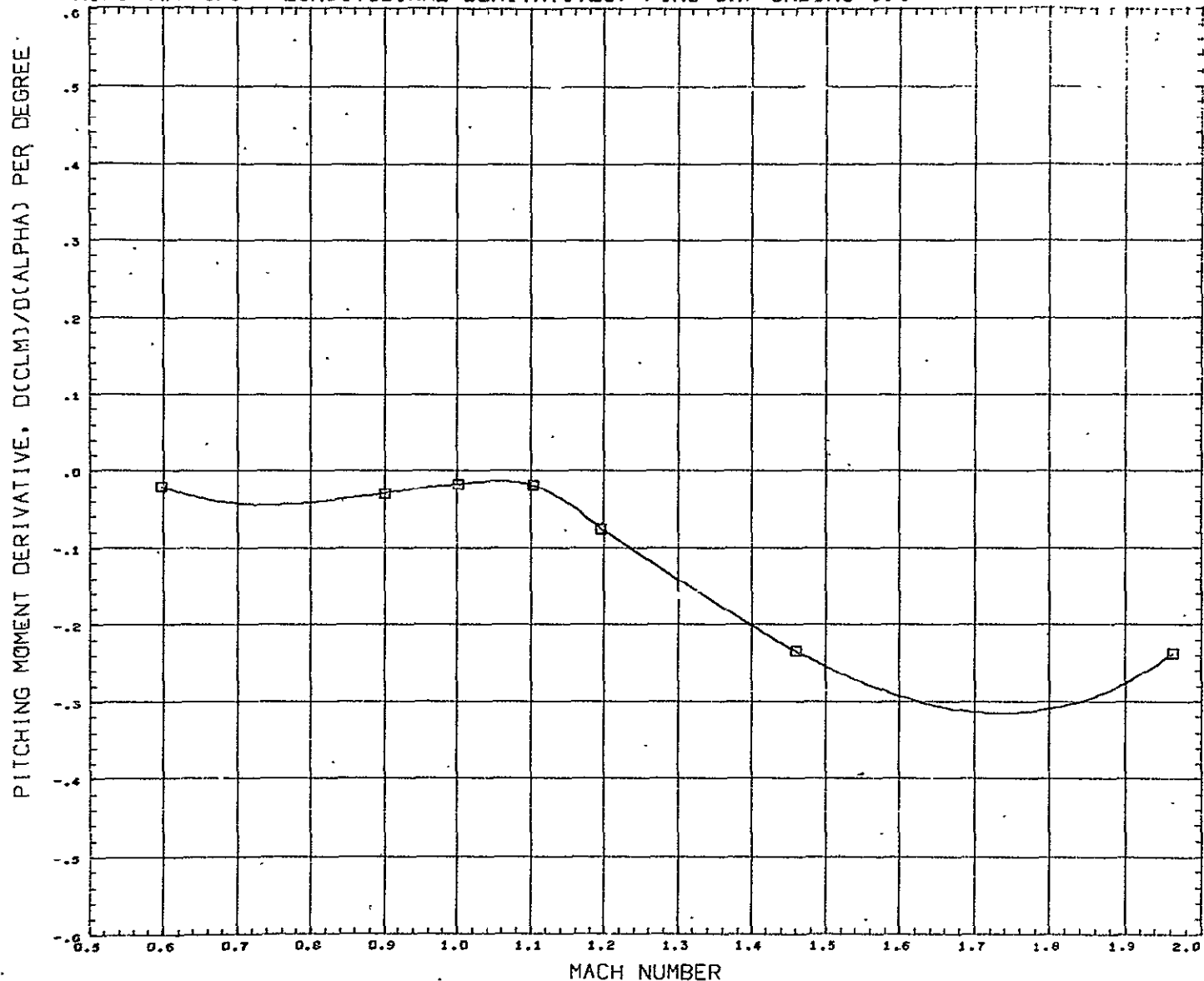


PARAMETRIC VALUES
 BETA - 0.070 ORBINC 0.000
 WINGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE V

MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS ON, ORBINC=0.0



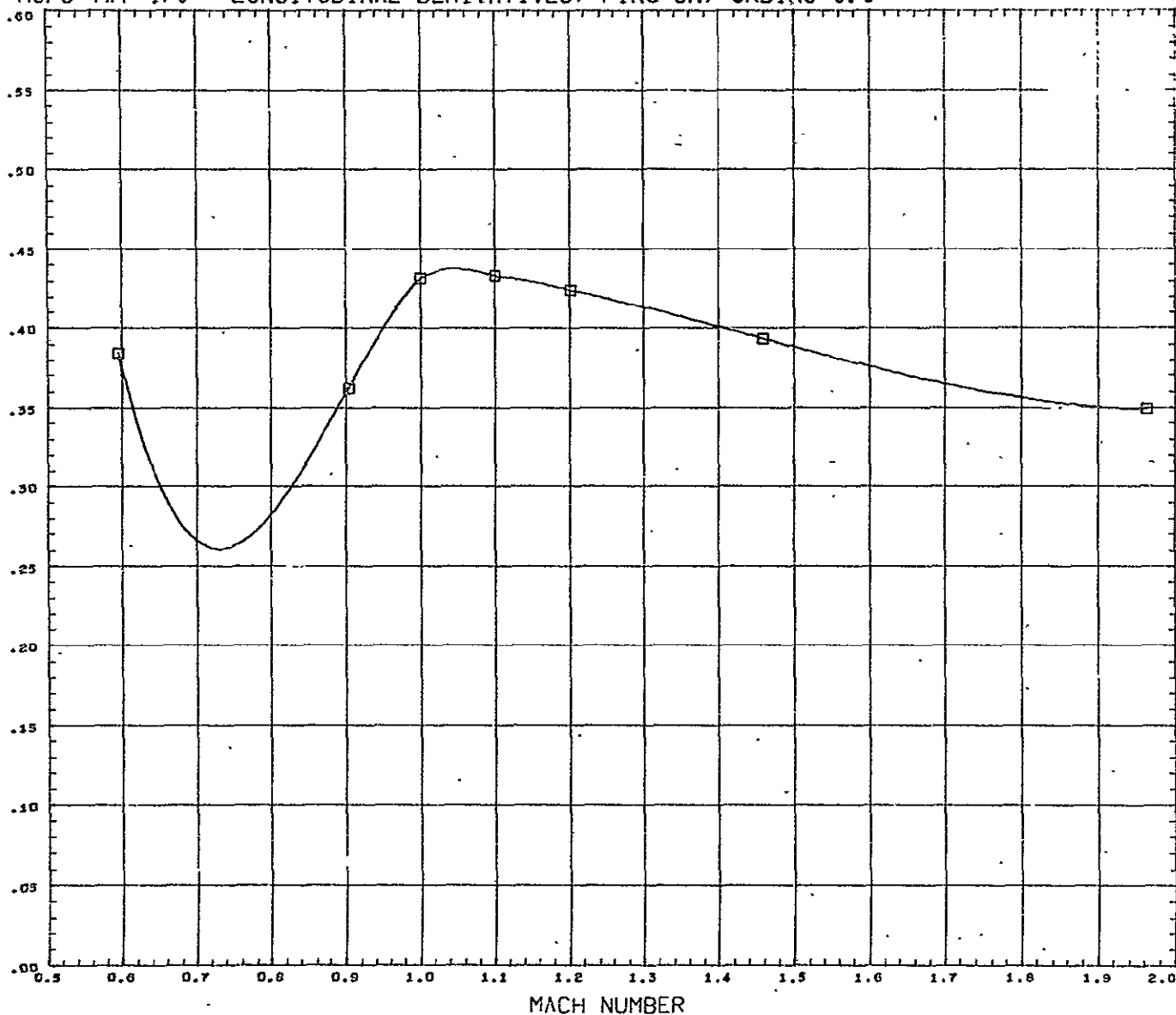
PARAMETRIC VALUES
 BETA - 0.070 ORBINC 0.000
 WINGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XHRF 5.2640 INCHES
 YHRF 0.0000 INCHES
 ZHRF 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE V

MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS ON, ORBINC=0.0

NORMAL FORCE DERIVATIVE, $D(CN)/D(\alpha)$ PER DEGREE

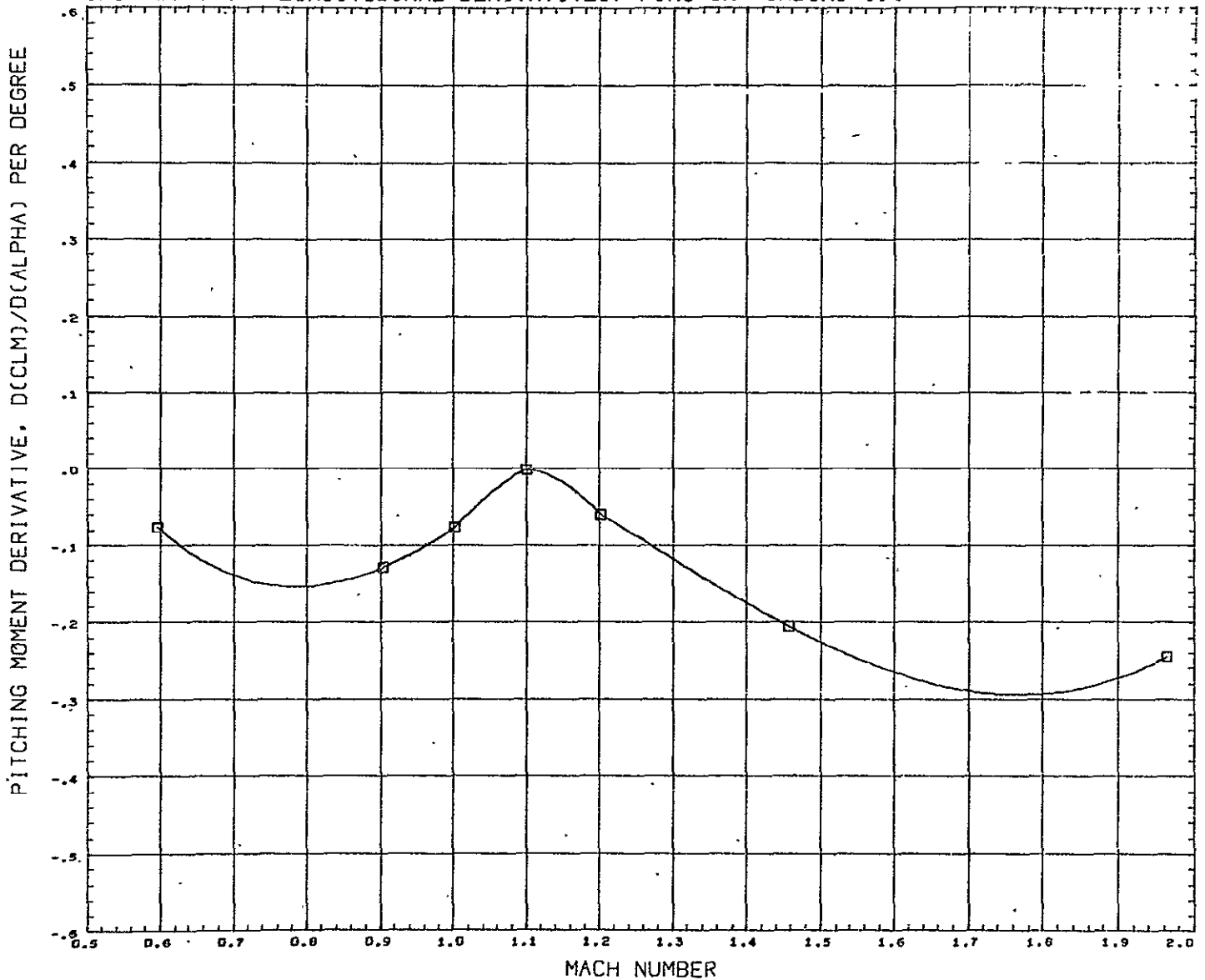


PARAMETRIC VALUES
 BETA - 0.090 ORBINC 0.000
 WINGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XHRP 5.2640 INCHES
 YHRP 0.0000 INCHES
 ZHRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE V

MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS ON, ORBINC=0.0



PARAMETRIC VALUES
 BETA - 0.090 ORBINC 0.000
 WINGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XHRP 5.2640 INCHES
 YHRP 0.0000 INCHES
 ZHRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE V

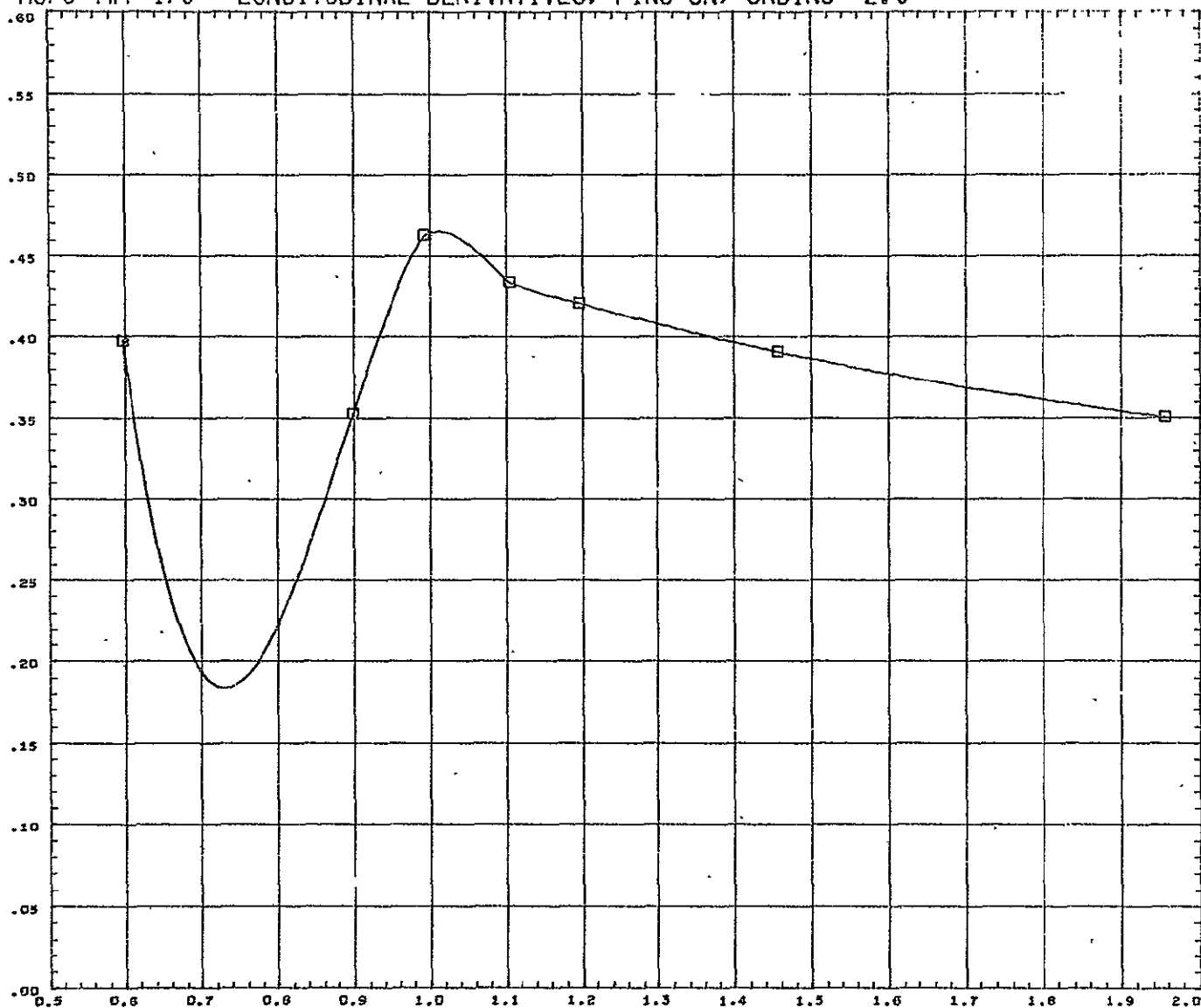
TWT470 S-IC/GAC ORBITER BF10WHVS FINS ON

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MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS ON, ORBINC=-2.0

NORMAL FORCE DERIVATIVE, $D(CN)/D(\alpha)$ PER DEGREE



MACH NUMBER

PARAMETRIC VALUES

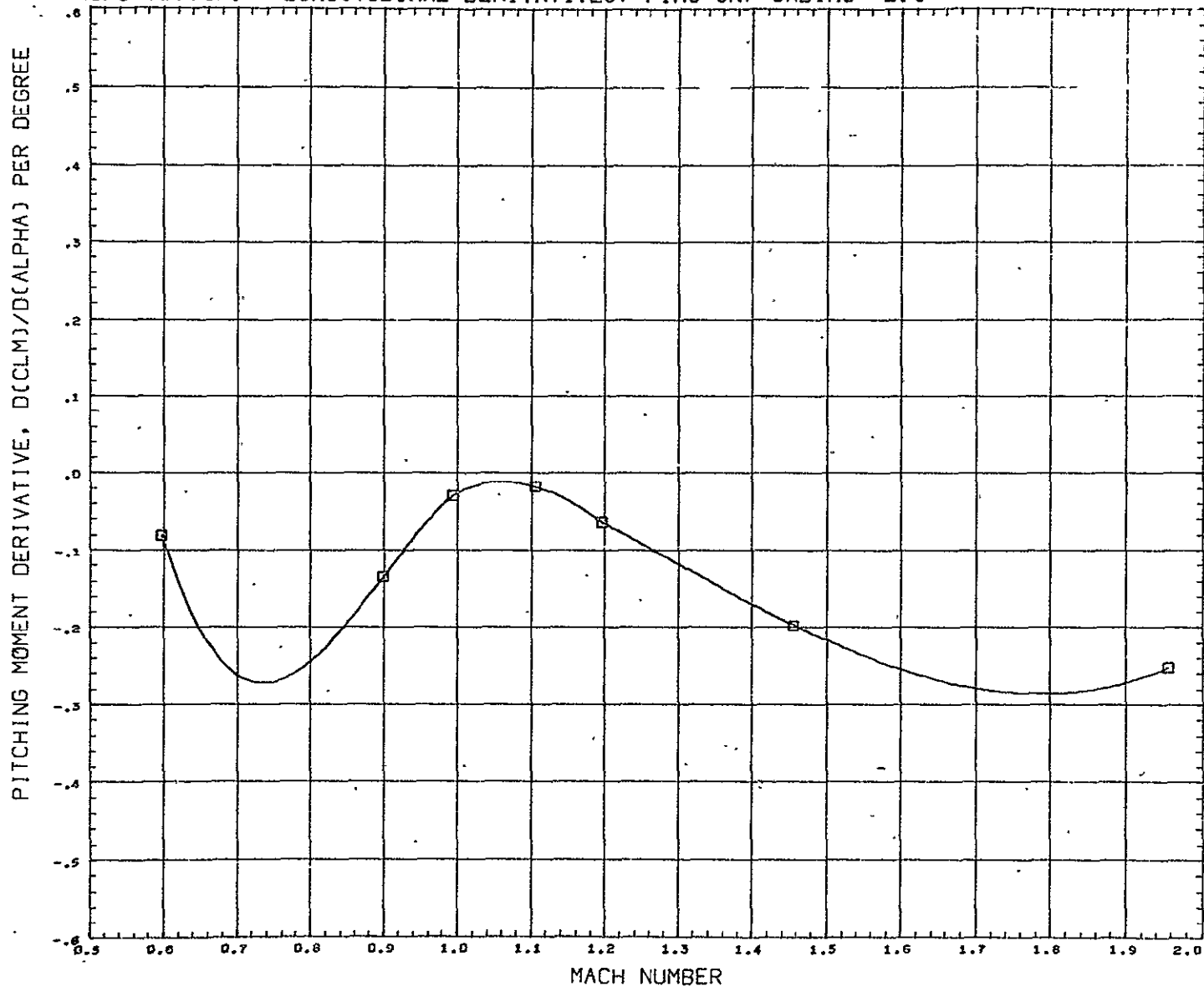
BETA - 0.070 ORBINC - 2.000
WINGINC 4.000 HTAIL 0.000
PHIB 0.000

REFERENCE INFORMATION

REFS 1.3960 SQ. IN.
REFL 1.3330 INCHES
REFB 1.3330 INCHES
XMRP 5.2640 INCHES
YMRP 0.0000 INCHES
ZMRP 0.0000 INCHES
SCALE 0.3366 PERCENT

DATA HIST. CODE V

MSFC TWT.470 LONGITUDINAL DERIVATIVES, FINS ON, ORBINC=-2.0



PARAMETRIC VALUES
 BETA - 0.070 ORBINC - 2.000
 WINGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REF0 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE V

TWT470 S-IC/GAC ORBITER BF10WHVS FINS ON

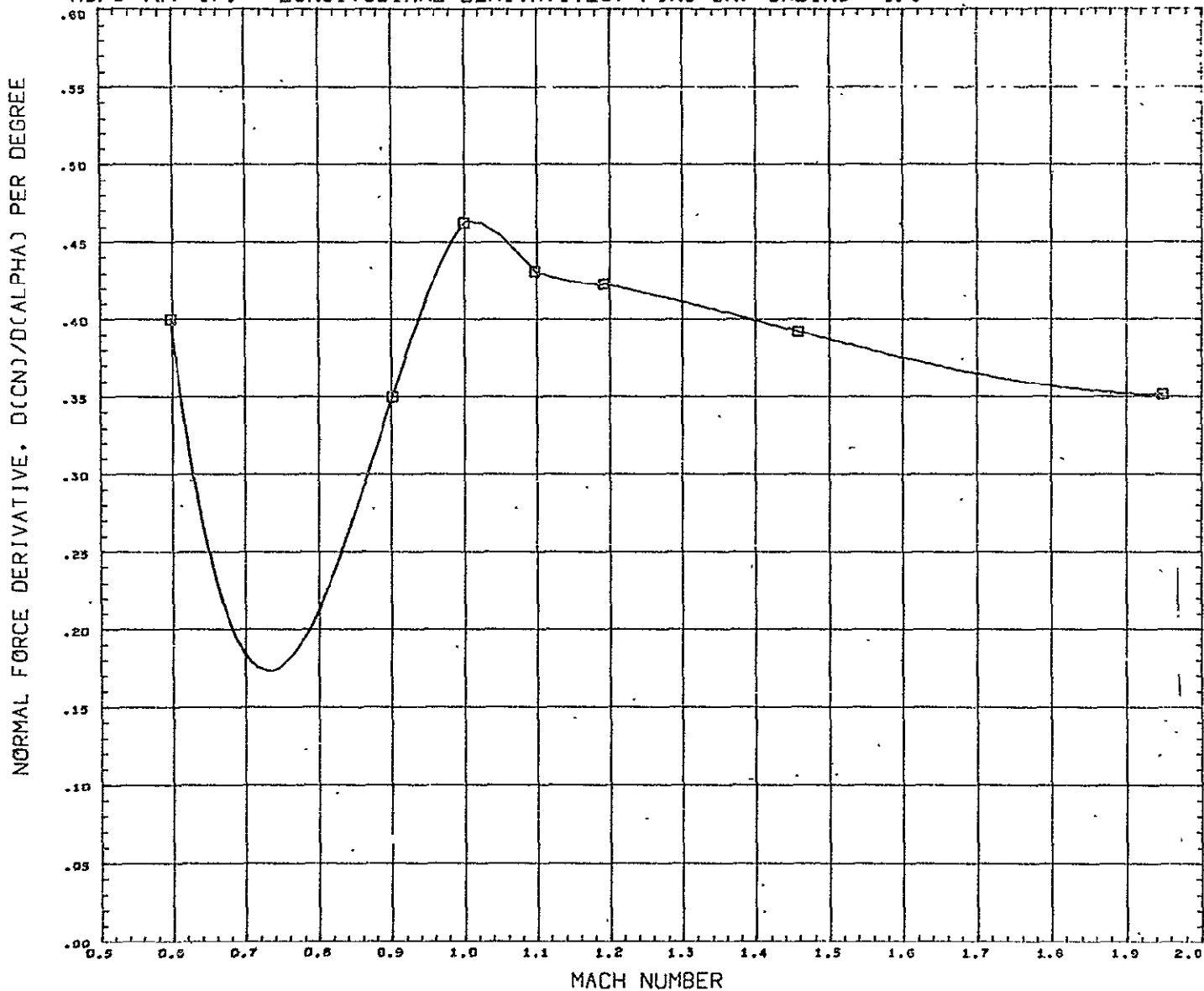
(V24031)

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180

MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS ON, ORBINC=-4.0



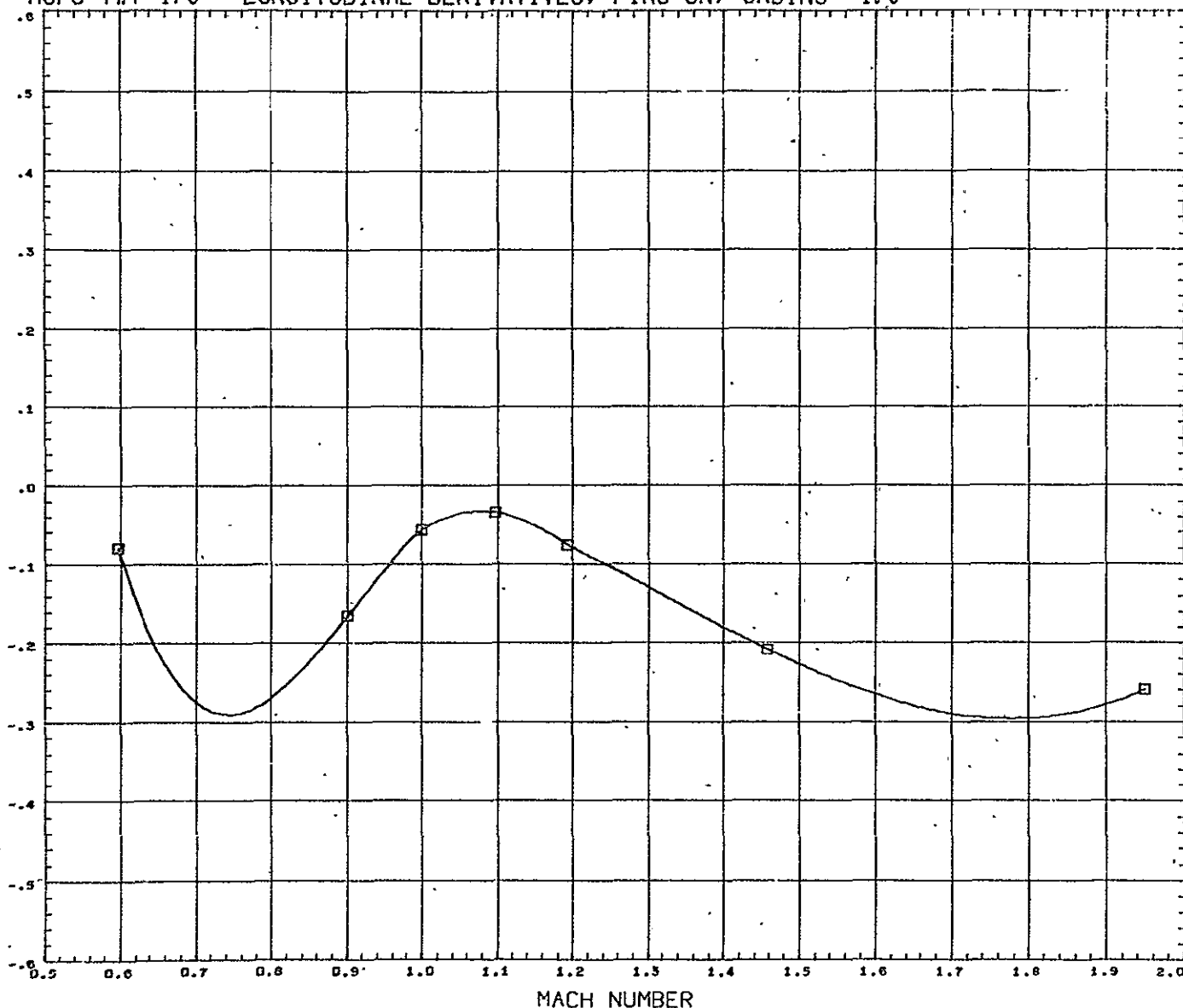
PARAMETRIC VALUES
 BETA - 0.050 ORBINC - 4.000
 WINGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE Y

MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS ON, ORBINC=-4.0

PITCHING MOMENT DERIVATIVE, $D(CLM)/D(\alpha)$ PER DEGREE



PARAMETRIC VALUES
 BETA - 0.050 ORBINC - 4.000
 WINGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XNRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE V

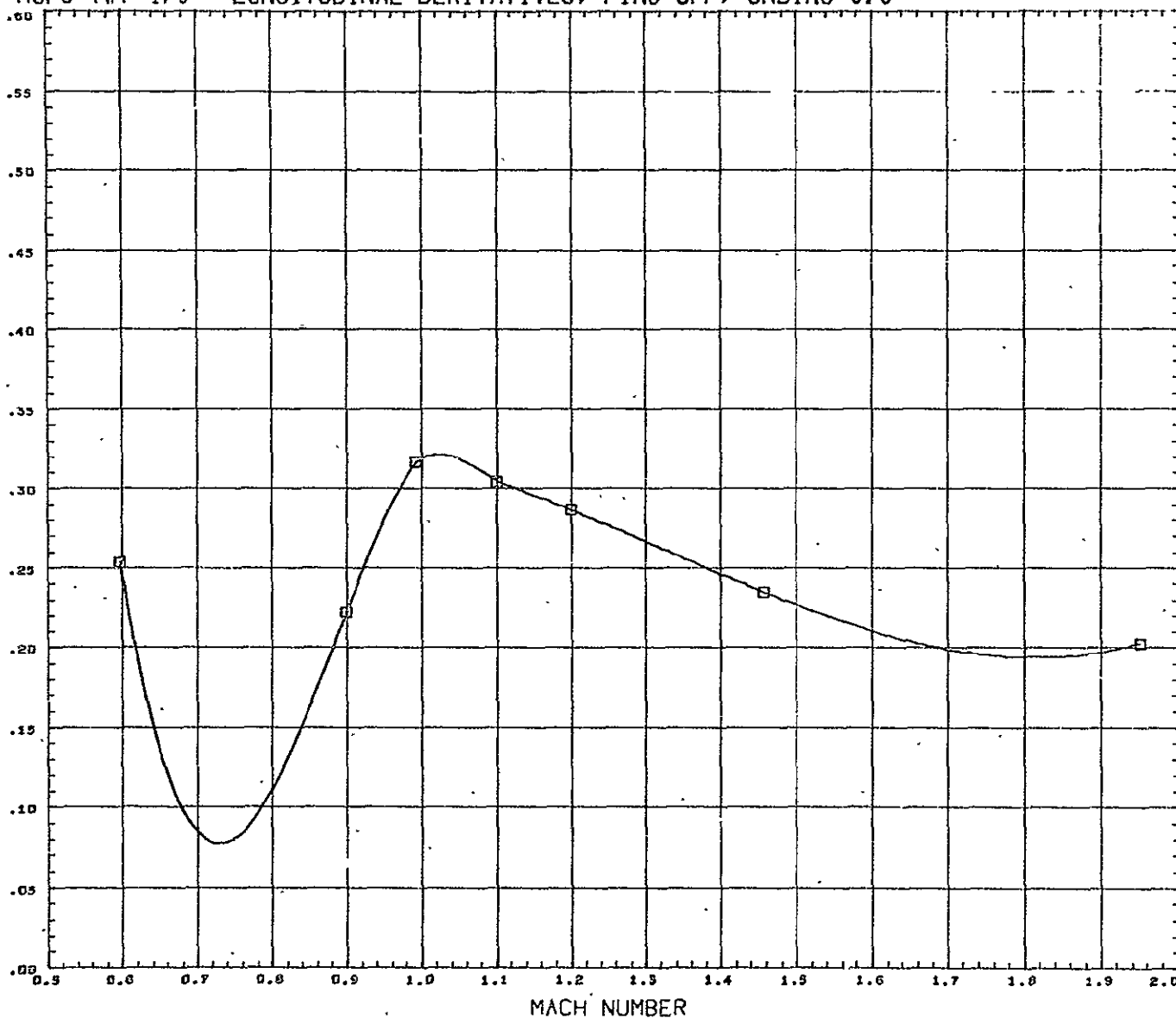
TWT470 S-IC/GAC ORBITER BF10WHVS FINS ON

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MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS OFF, ORBINC=0.0

NORMAL FORCE DERIVATIVE, $D(CN)/D(\alpha)$ PER DEGREE

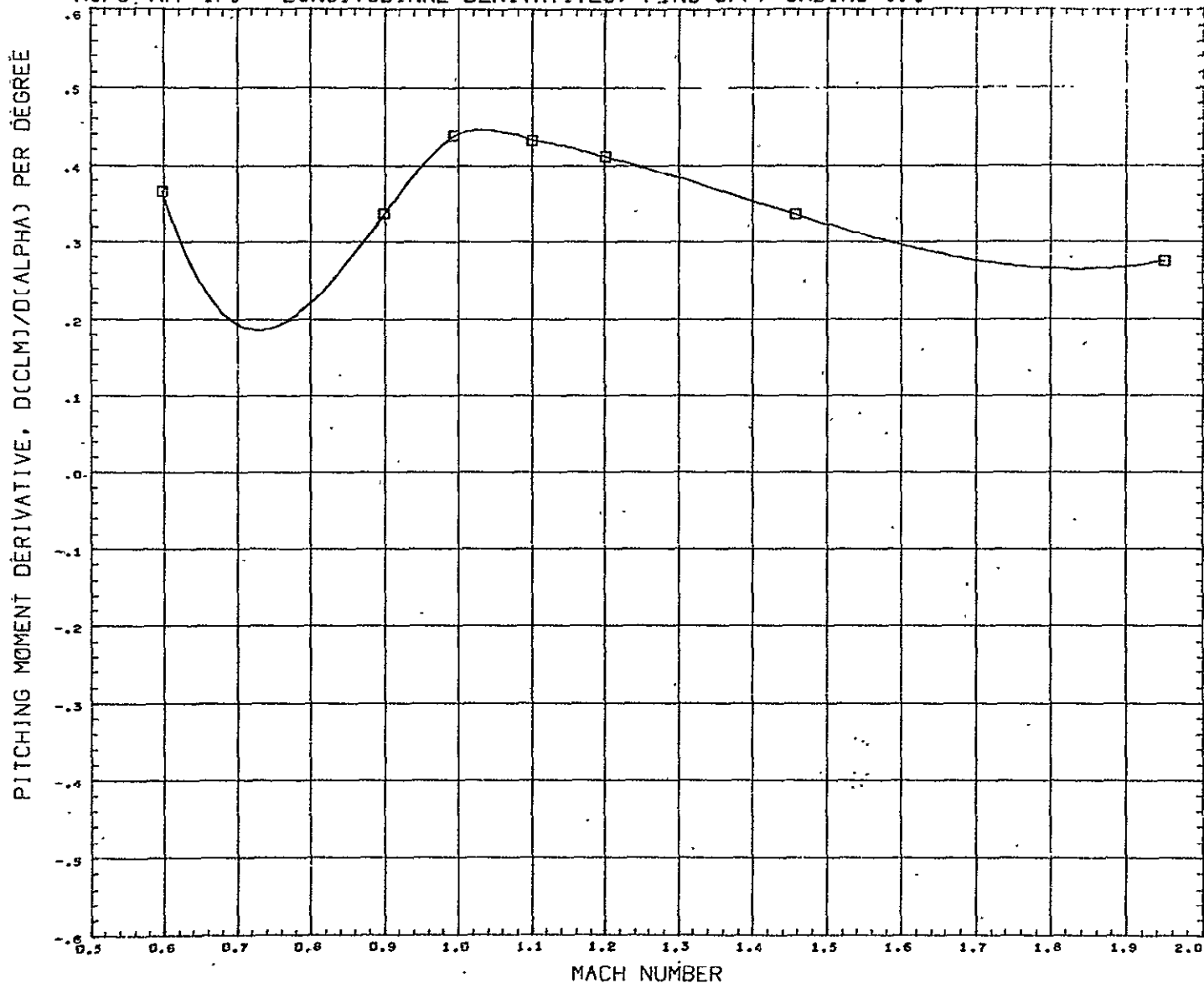


PARAMETRIC VALUES
 BETA - 0.050 ORBINC 0.000
 WINGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XHRP 5.2640 INCHES
 YHRP 0.0000 INCHES
 ZHRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE V

MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS OFF, ORBINC=0.0



PARAMETRIC VALUES

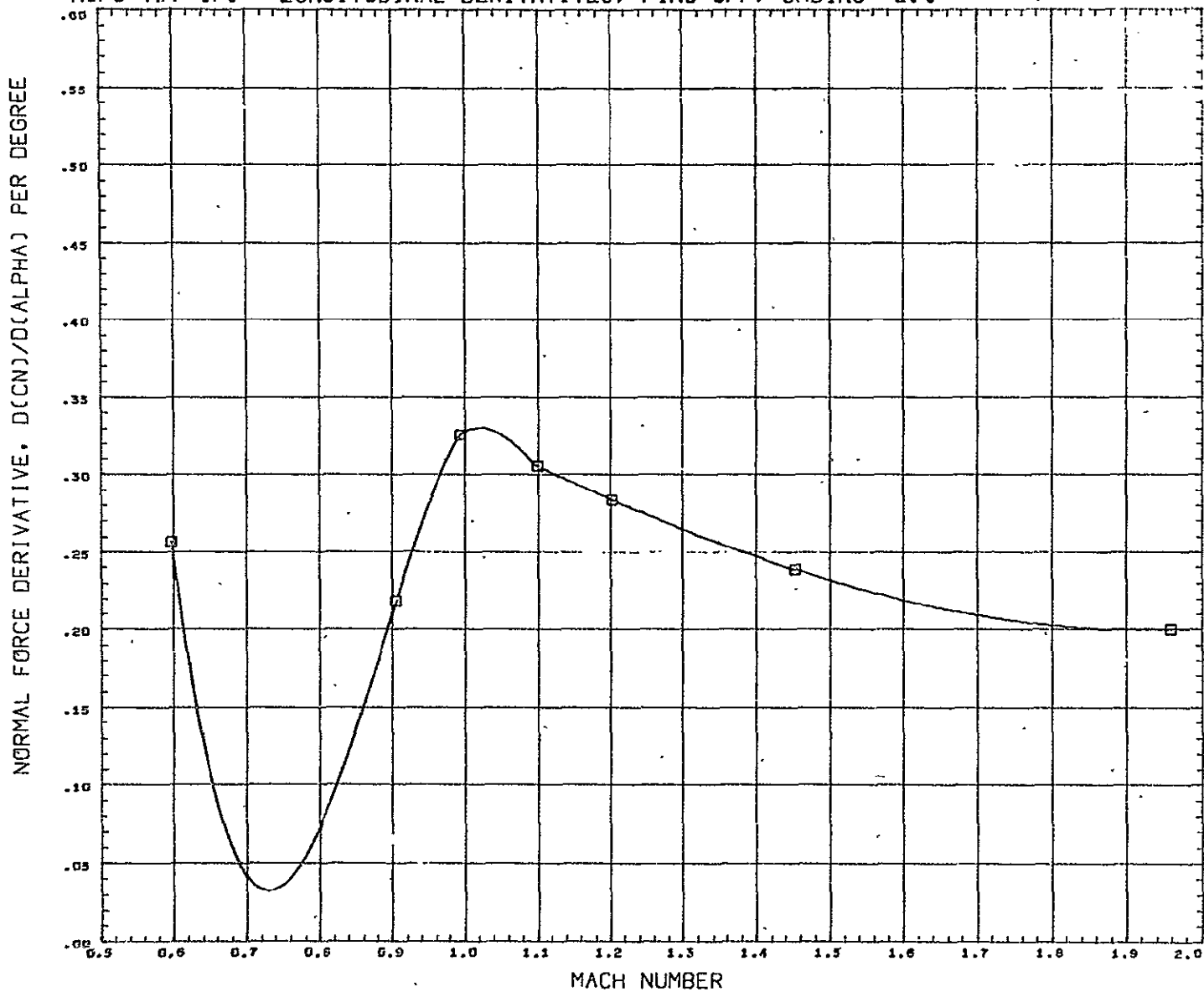
BETA	- 0.050	ORBINC	0.000
WINGINC	4.000	HTAIL	0.000
PHIB	0.000		

DATA HIST. CODE V

REFERENCE INFORMATION

REFS	1.3960	sq. in.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS OFF, ORBINC=-2.0



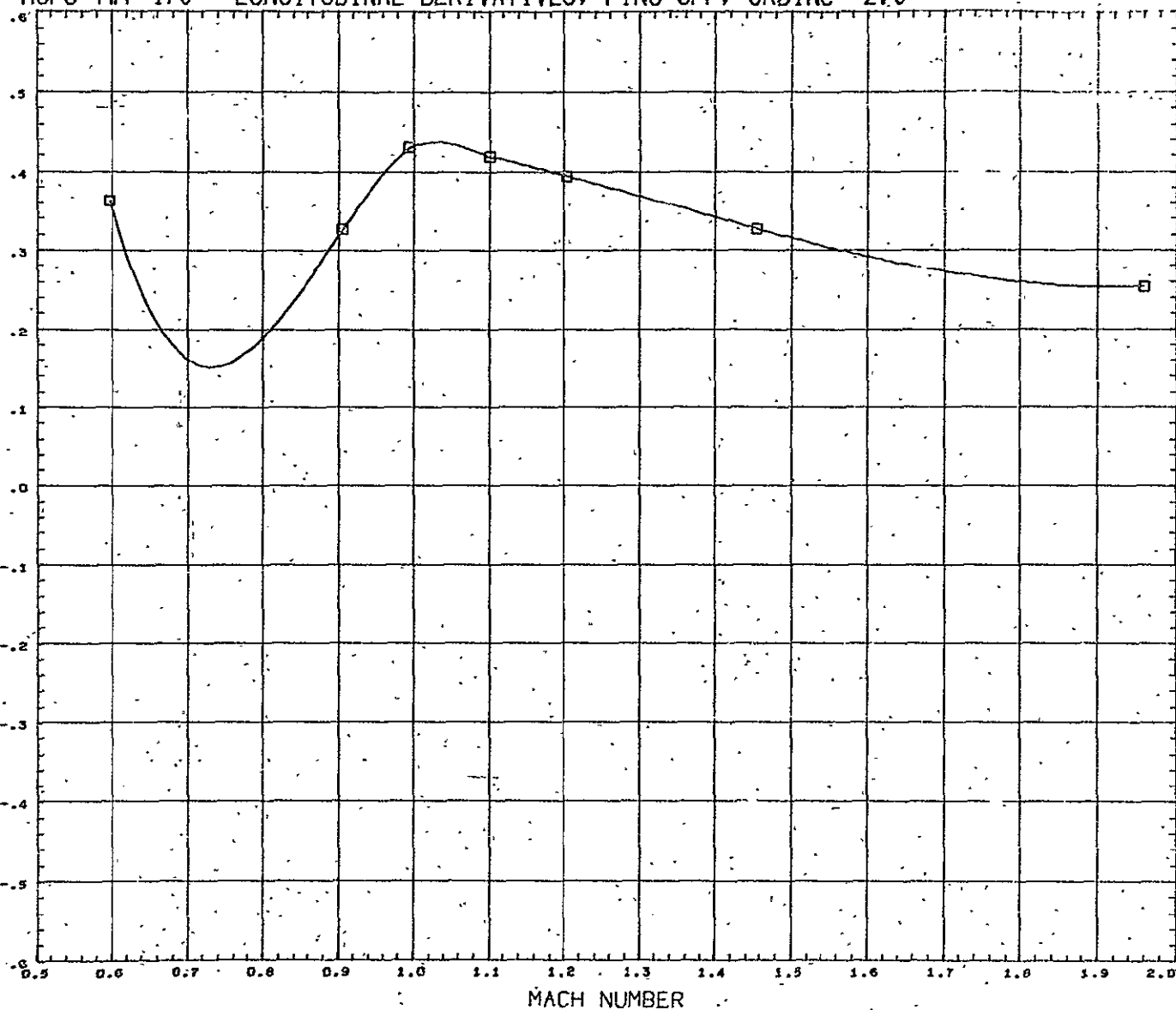
PARAMETRIC VALUES
 BETA - 0.000 ORBINC - 2.000
 WINGINC 4.000 NTAIL 0.000
 PHID 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XHRF 5.2640 INCHES
 YHRF 0.0000 INCHES
 ZHRF 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE V

MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS OFF, ORBINC=-2.0

PITCHING MOMENT DERIVATIVE, $dC_{LM}/d\alpha$ PER DEGREE



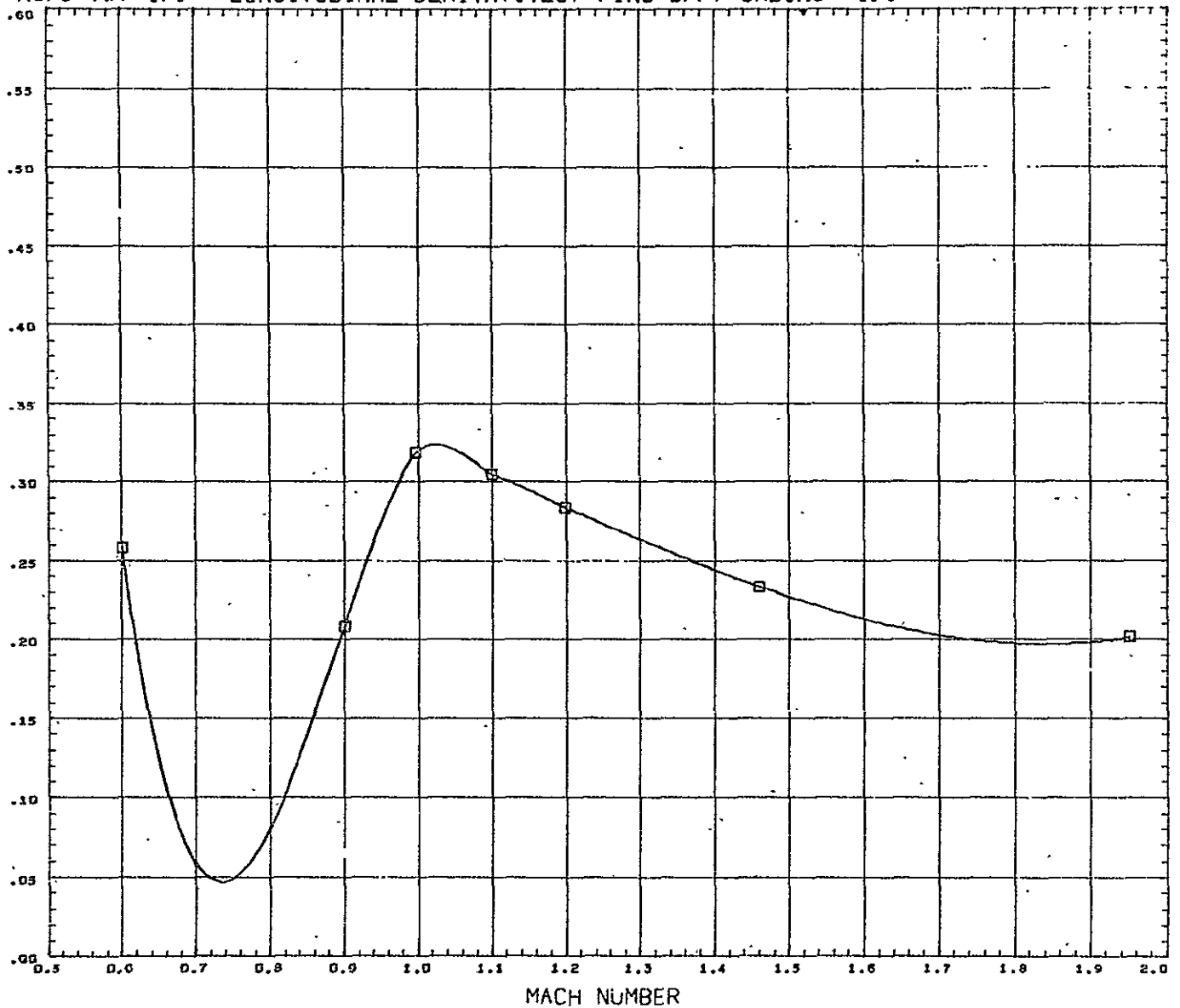
PARAMETRIC VALUES
 BETA - 0.000 ORBINC - -2.000
 WINGINC 4.000 HTAIL - 0.000
 PNIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE. V

MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS OFF, ORBINC=-4.0

NORMAL FORCE DERIVATIVE, $D(CN)/D(\alpha)$ PER DEGREE



PARAMETRIC VALUES

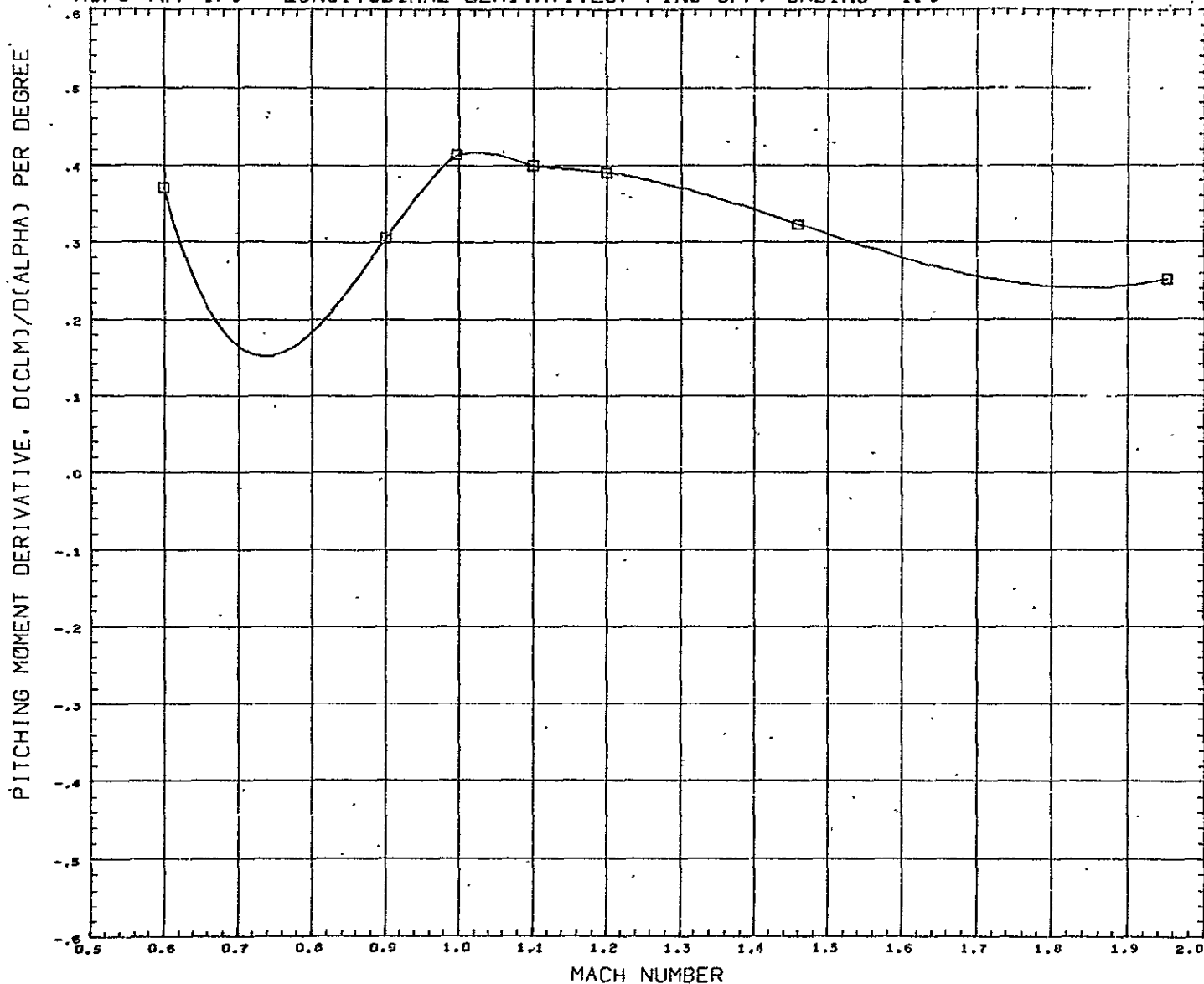
BETA	- 0.040	ORBINC	- 4.000
WINGINC	4.000	HTAIL	0.000
PHIB	0.000		

REFERENCE INFORMATION

REFS	1.3960	SG, IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3306	PERCENT

DATA HIST. CODE V

MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS OFF, ORBINC=-4.0



PARAMETRIC VALUES
 BETA - 0.040 ORBINC - 4.000
 WINGINC 4.000 HTAIL 0.000
 PHIB 0.000

DATA HIST. CODE V

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

TWT470 S-IC/GAC ORBITER BOWHVS

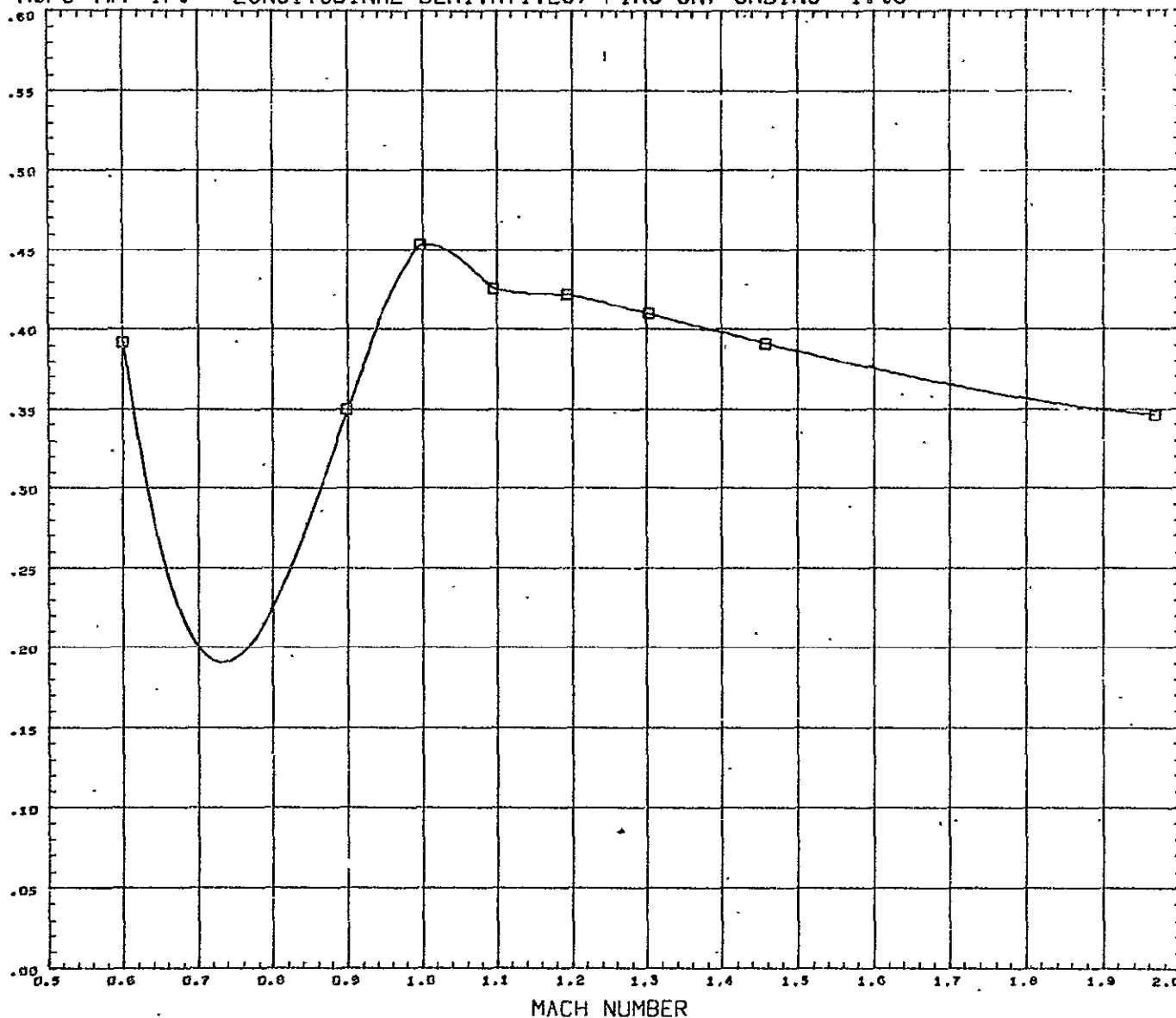
FINS OFF

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MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS ON, ORBINC=-1.05

NORMAL FORCE DERIVATIVE, $D(CN)/D(\alpha)$ PER DEGREE



PARAMETRIC VALUES

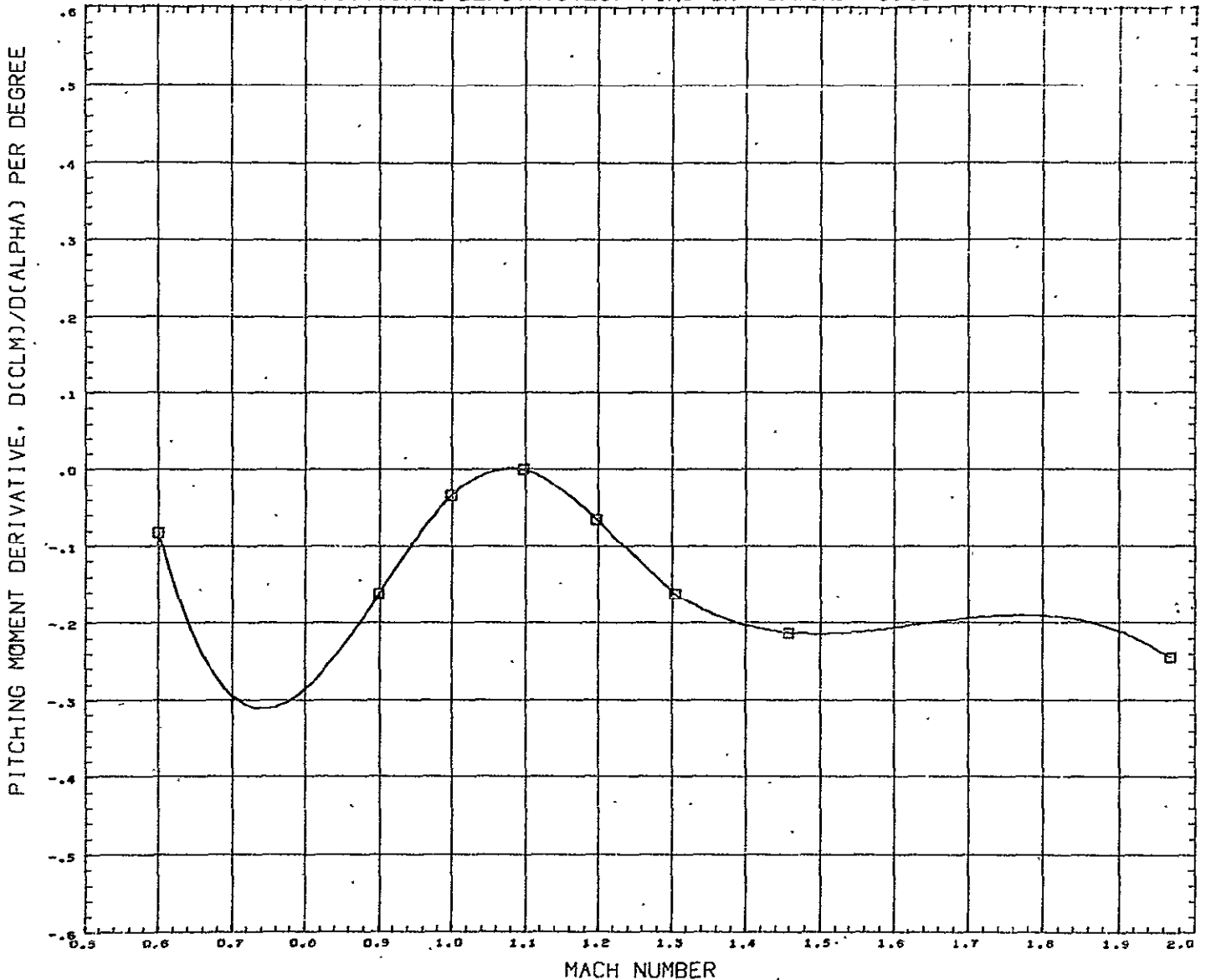
BETA	- 0.050	ORBINC	- 1.050
WINGINC	4.000	NTAIL	0.000
FWIB	0.000		

DATA HIST. CODE V

REFERENCE INFORMATION

REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS ON, ORBINC=-1.05



PARAMETRIC VALUES
 BETA - 0.050 ORBINC - 1.050
 WINGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

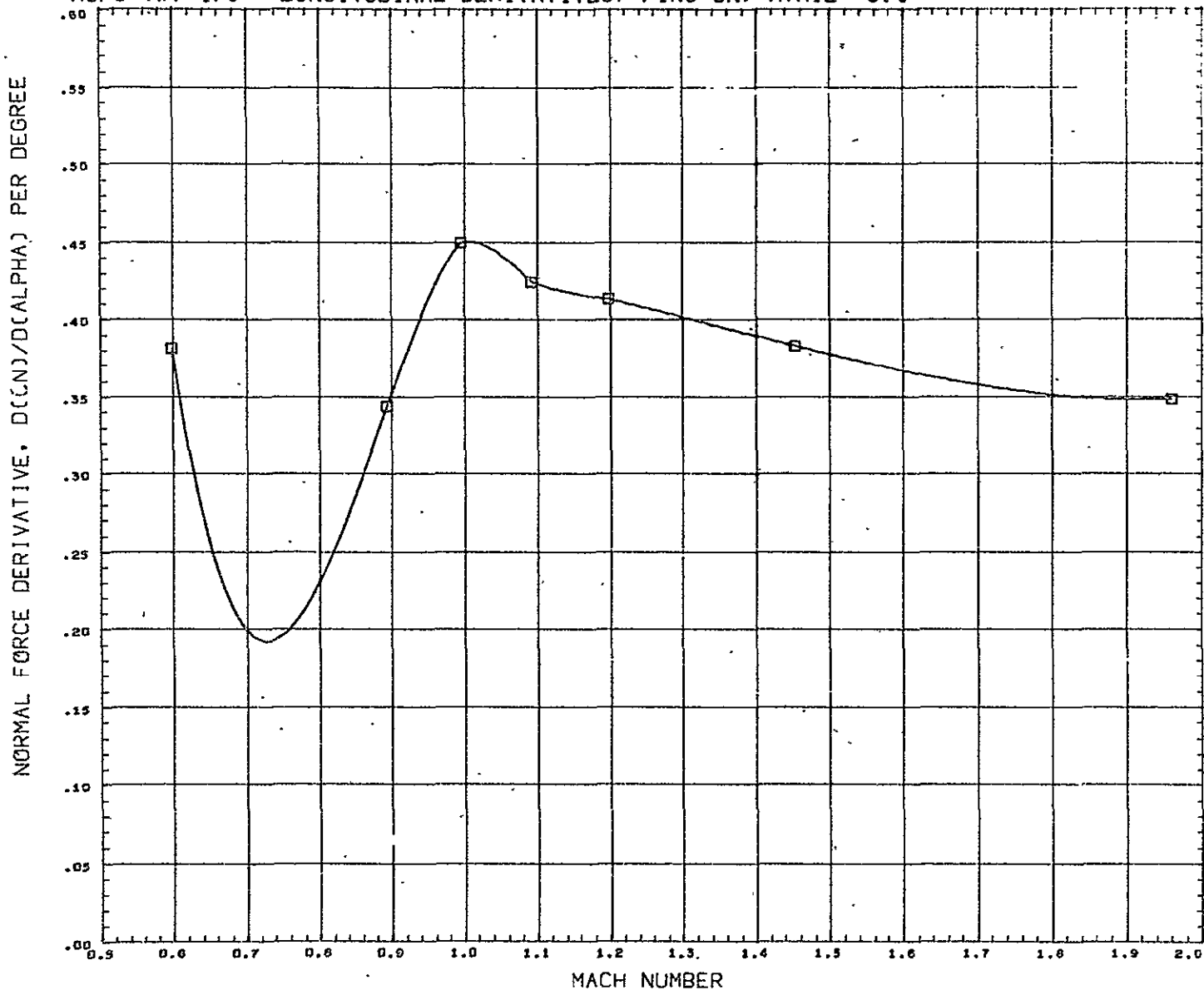
DATA HIST. CODE V

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 LONGITUDINAL DERIVATIVES, FINS ON, HTAIL=-5.0



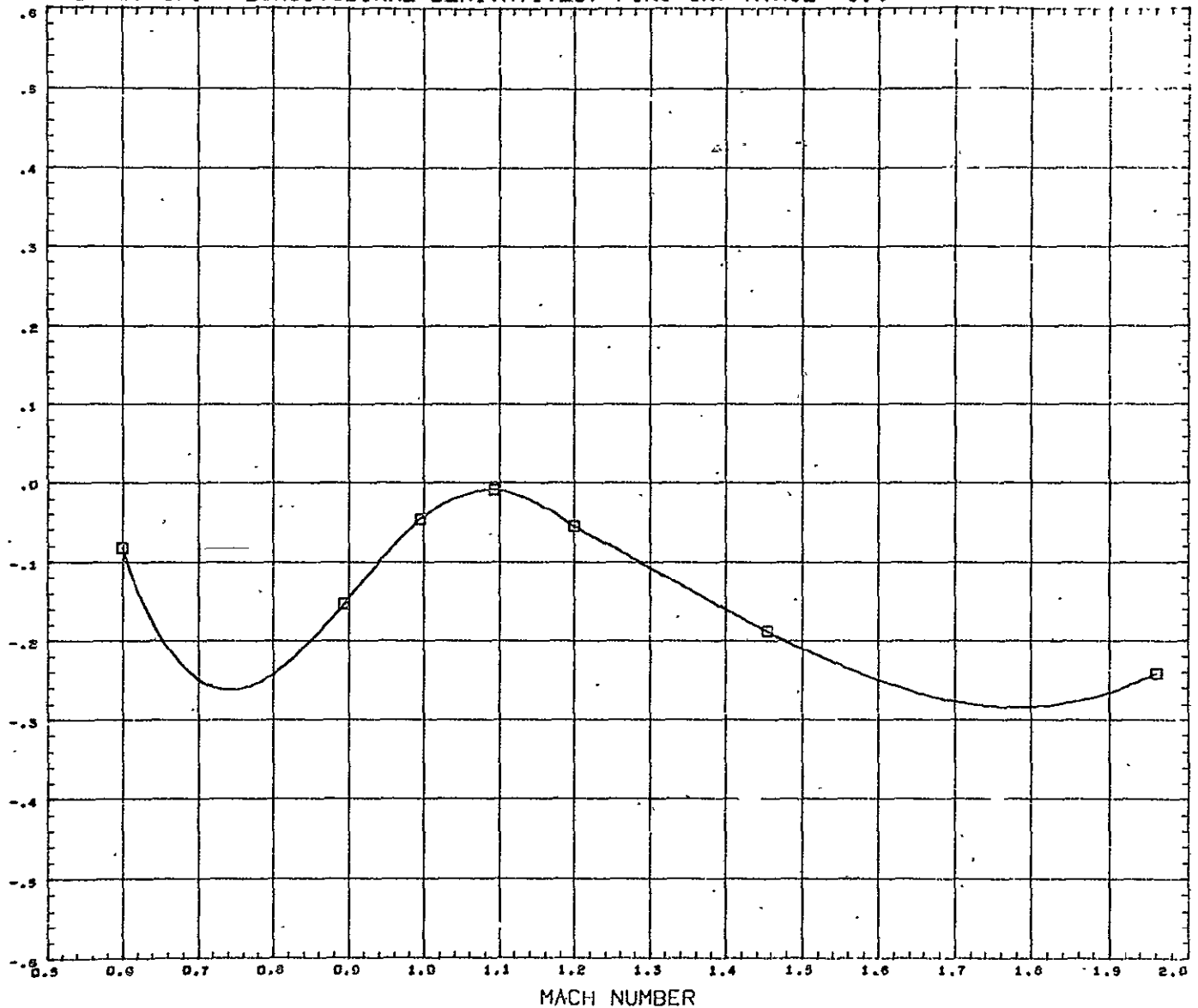
PARAMETRIC VALUES
 BETA - 0.020 ORBINC - 1.050
 WINGINC 4.000 HTAIL - 5.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE V

MSFC TWT 470 LONGITUDINAL DERIVATIVES; FINS ON, HTAIL=-5.0

PITCHING MOMENT DERIVATIVE, $D(CLM)/D(\alpha)$ PER DEGREE



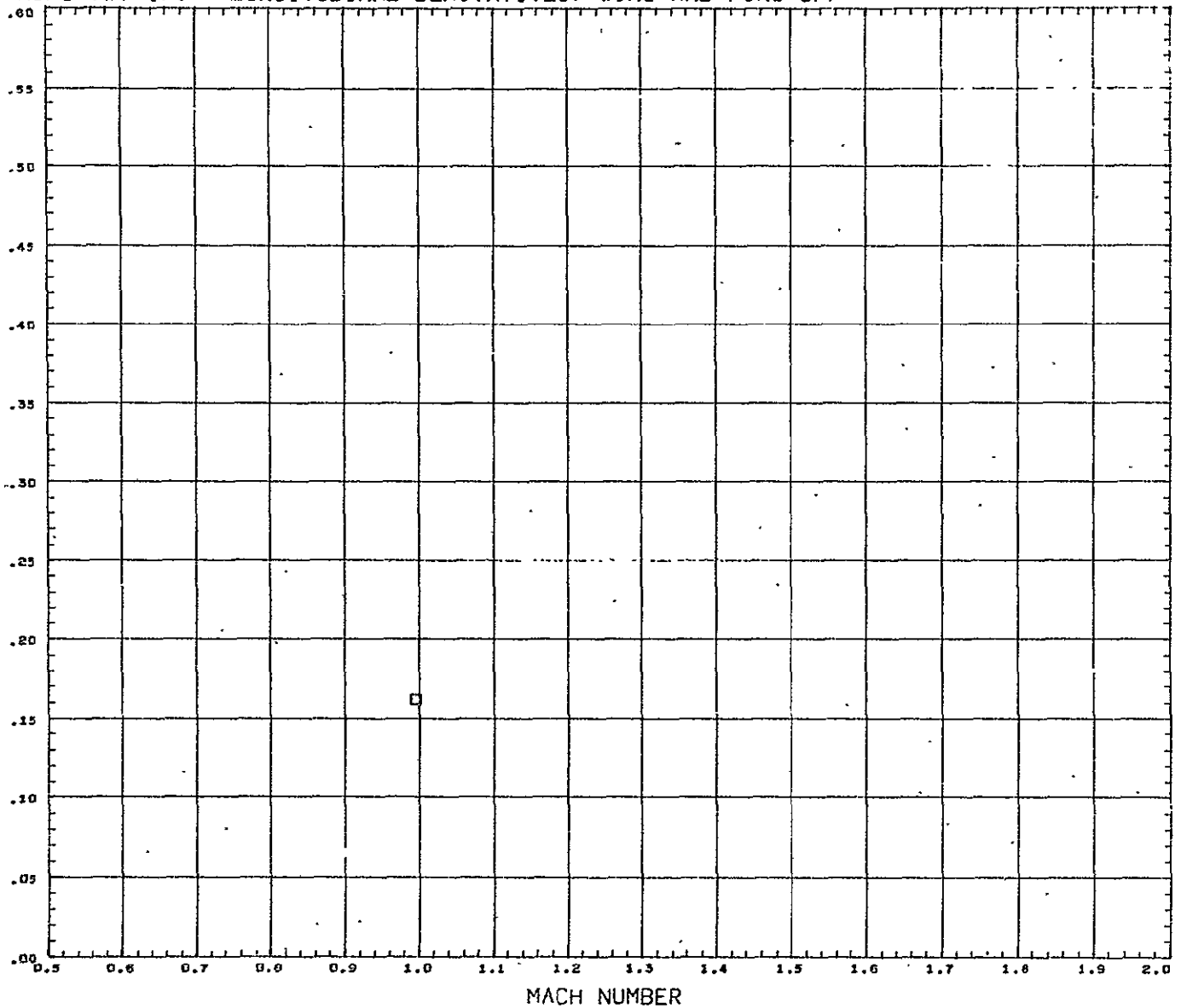
PARAMETRIC VALUES
 BETA - 0.020 ORBINC - 1.050
 WINGINC 4.000 HTAIL - 5.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XNRP 5.2640 INCHES
 YNRP 0.0000 INCHES
 ZNRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE V

MSFC TWT 470 LONGITUDINAL DERIVATIVES, WING AND FINS OFF

NORMAL FORCE DERIVATIVE, $D(CN)/D(\alpha)$ PER DEGREE

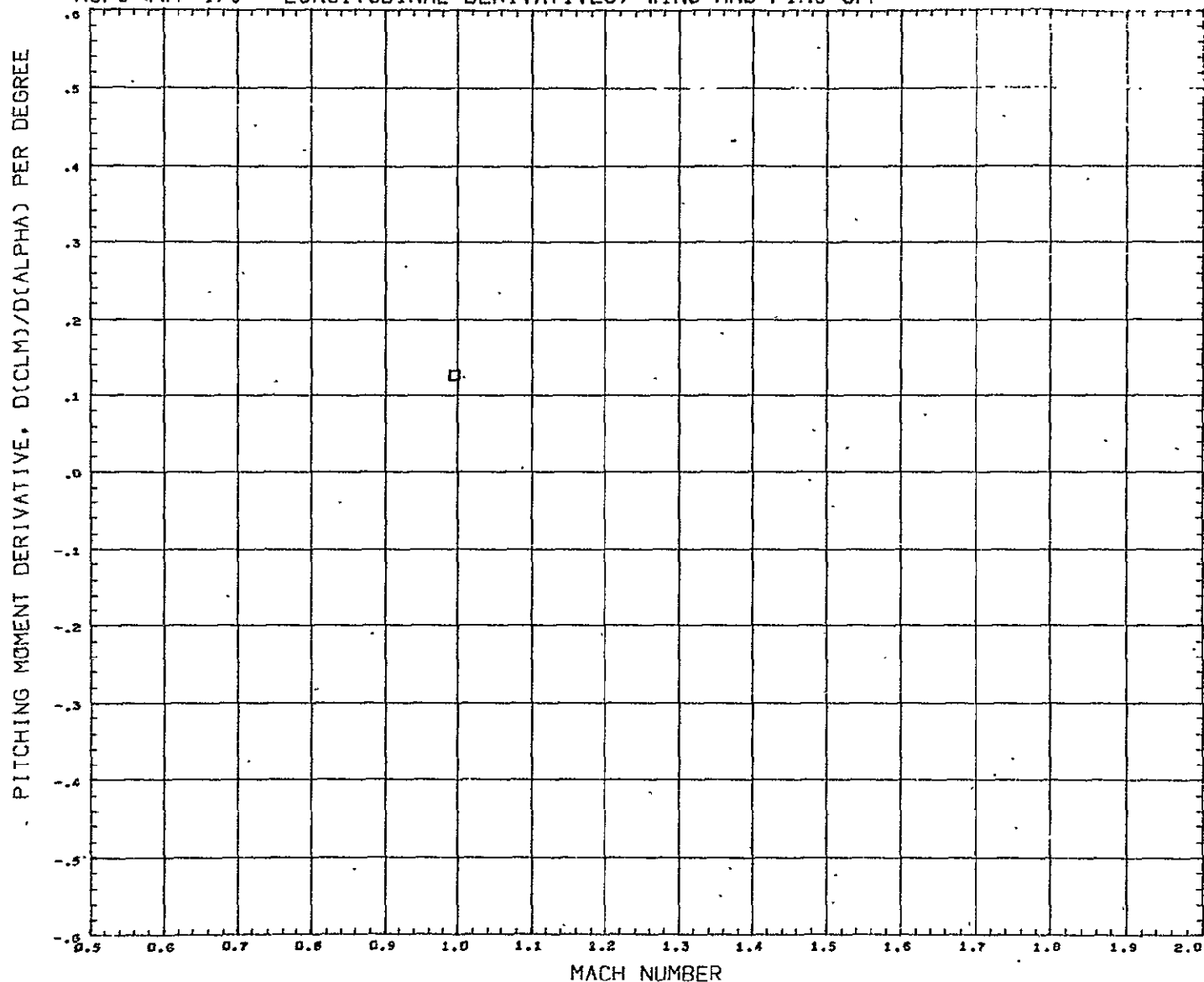


PARAMETRIC VALUES
 BETA - 0.100 ORBINC - 1.050
 NTAIL 0.000 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE V

MSFC TWT 470 LONGITUDINAL DERIVATIVES, WING AND FINS OFF



PARAMETRIC VALUES

BETA	- 0.100	ORBINC	- 1.050
HTAIL	0.000	PHIB	0.000

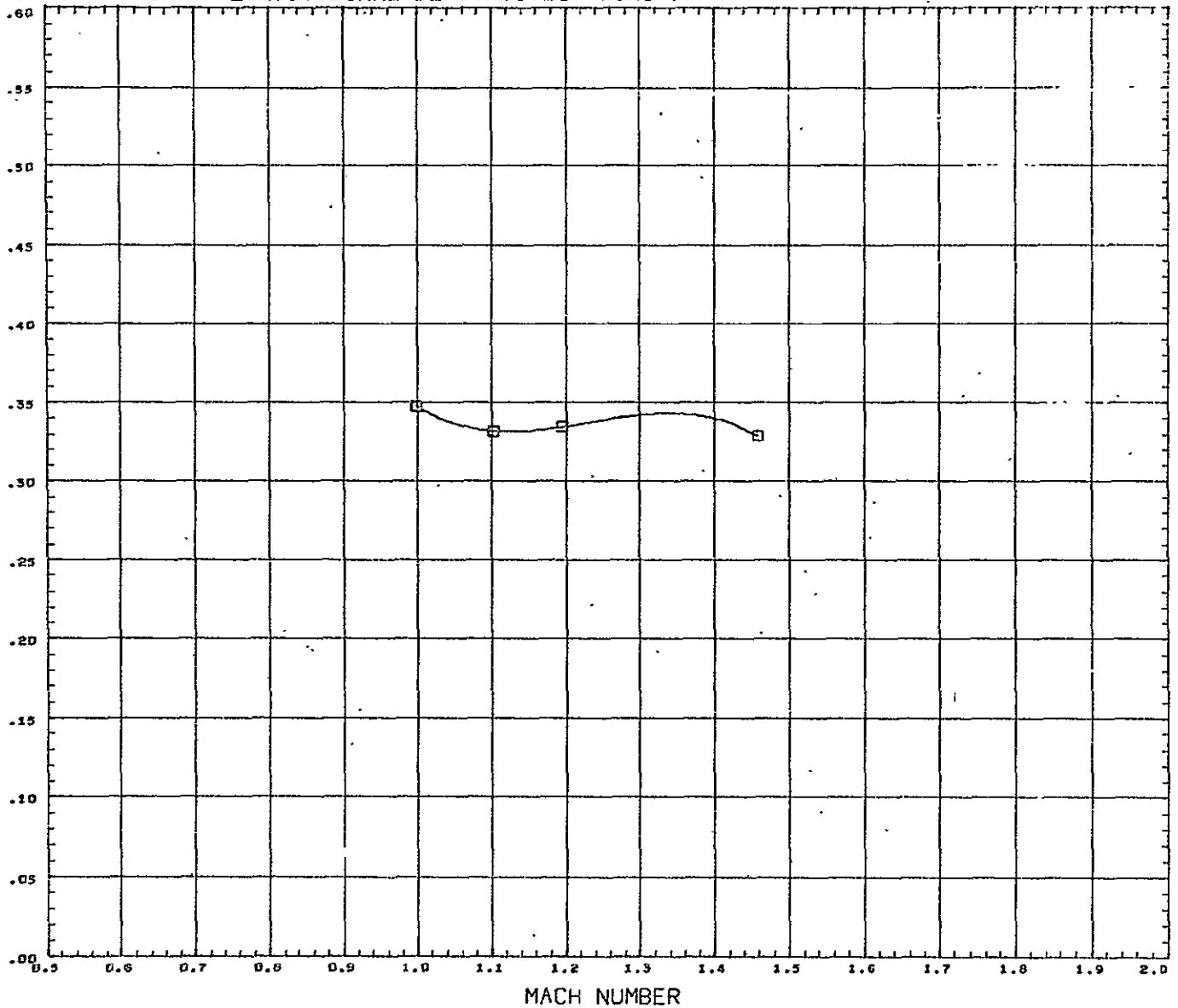
DATA HIST. CODE V

REFERENCE INFORMATION

REFS	1.3960	50. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LONGITUDINAL DERIVATIVES, WING OFF

NORMAL FORCE DERIVATIVE, $D(CN)/D(\alpha)$ PER DEGREE



PARAMETRIC VALUES

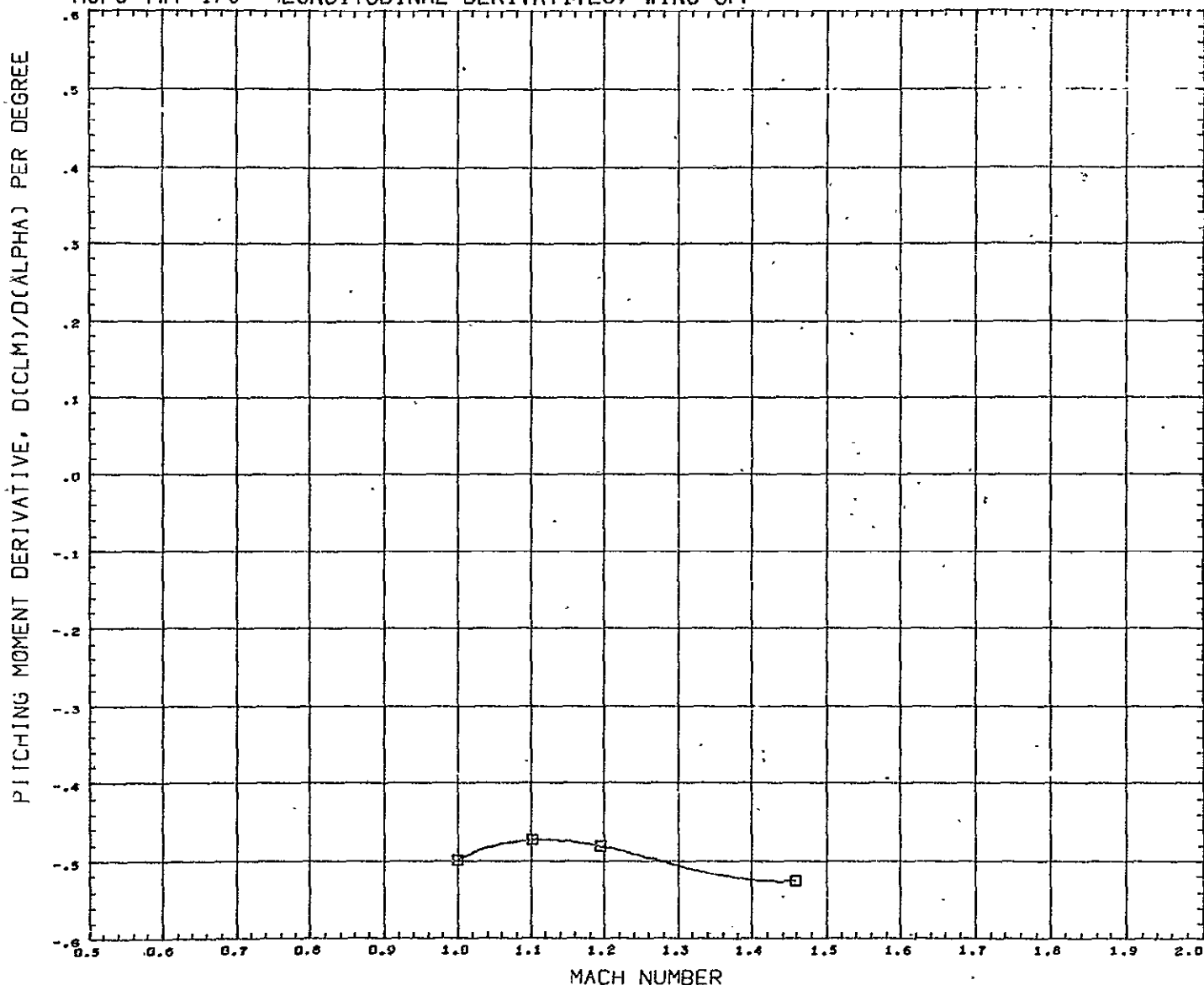
BETA - 0.100 ORBINC - 1.050
HTAIL 0.000 PHIB 0.000

REFERENCE INFORMATION

REFS 1.3960 SQ. IN.
REFL 1.3330 INCHES
REFB 1.3330 INCHES
XMRP 5.2640 INCHES
YMRP 0.0000 INCHES
ZMRP 0.0000 INCHES
SCALE 0.3366 PERCENT

DATA HIST. CODE V

MSFC TWT 470 LONGITUDINAL DERIVATIVES, WING OFF



PARAMETRIC VALUES
 BETA - 0.100 ORBINC - 1.050
 HTAIL 0.000 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XHRP 5.2640 INCHES
 YHRP 0.0000 INCHES
 ZHRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE V

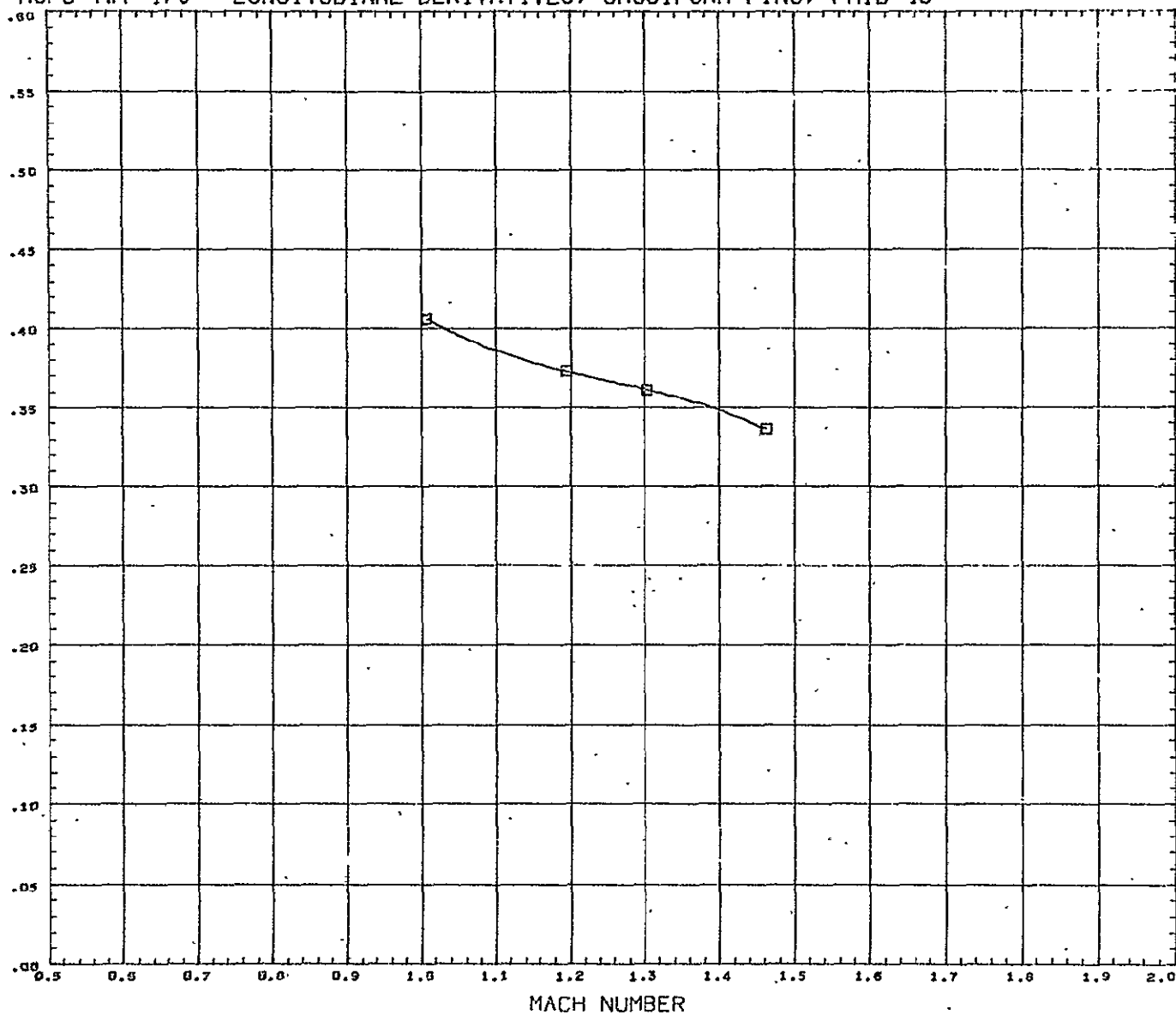
WT470 S-IC/GAC ORBITER BF10HVS WING OFF

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MSFC TWT 470 LONGITUDINAL DERIVATIVES, CRUCIFORM FINS, PHIB=45

NORMAL FORCE DERIVATIVE, $D(CN)/D(\alpha)$ PER DEGREE

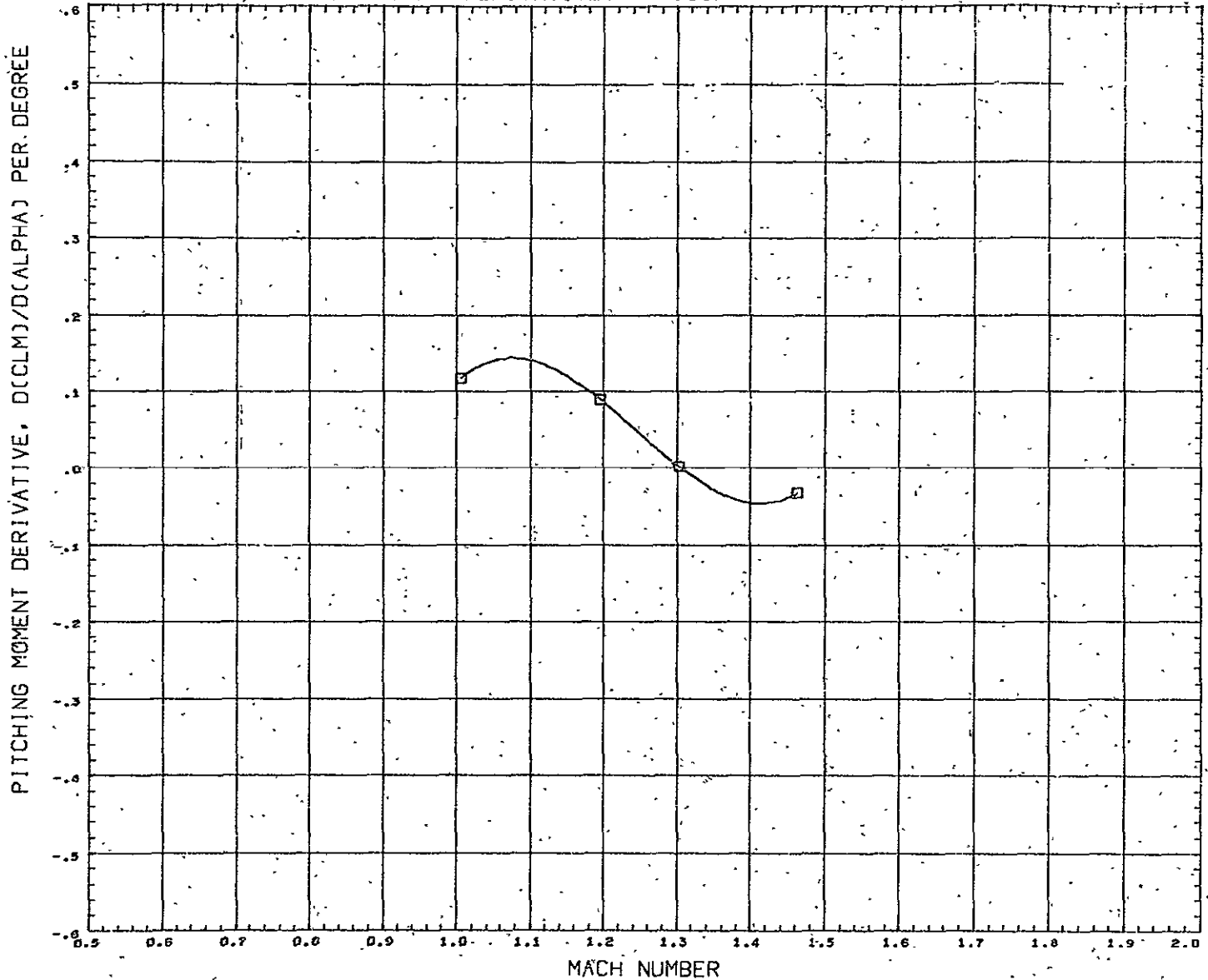


PARAMETRIC VALUES
 BETA - 0.070 ORBINC - 1.050
 WINGINC 4.000 HTAIL 0.000
 PHIB 45.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XNRP 5.2640 INCHES
 YNRP 0.0000 INCHES
 ZNRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE V

MSFC TWT 470, LONGITUDINAL DERIVATIVES, CRUCIFORM FINS, PHIB=45



PARAMETRIC VALUES.
 BETA - 0.070 ORBINC - 1.050
 WINGINC 4.000 HTAIL 0.000
 PHIB 45.000

DATA HIST. CODE V

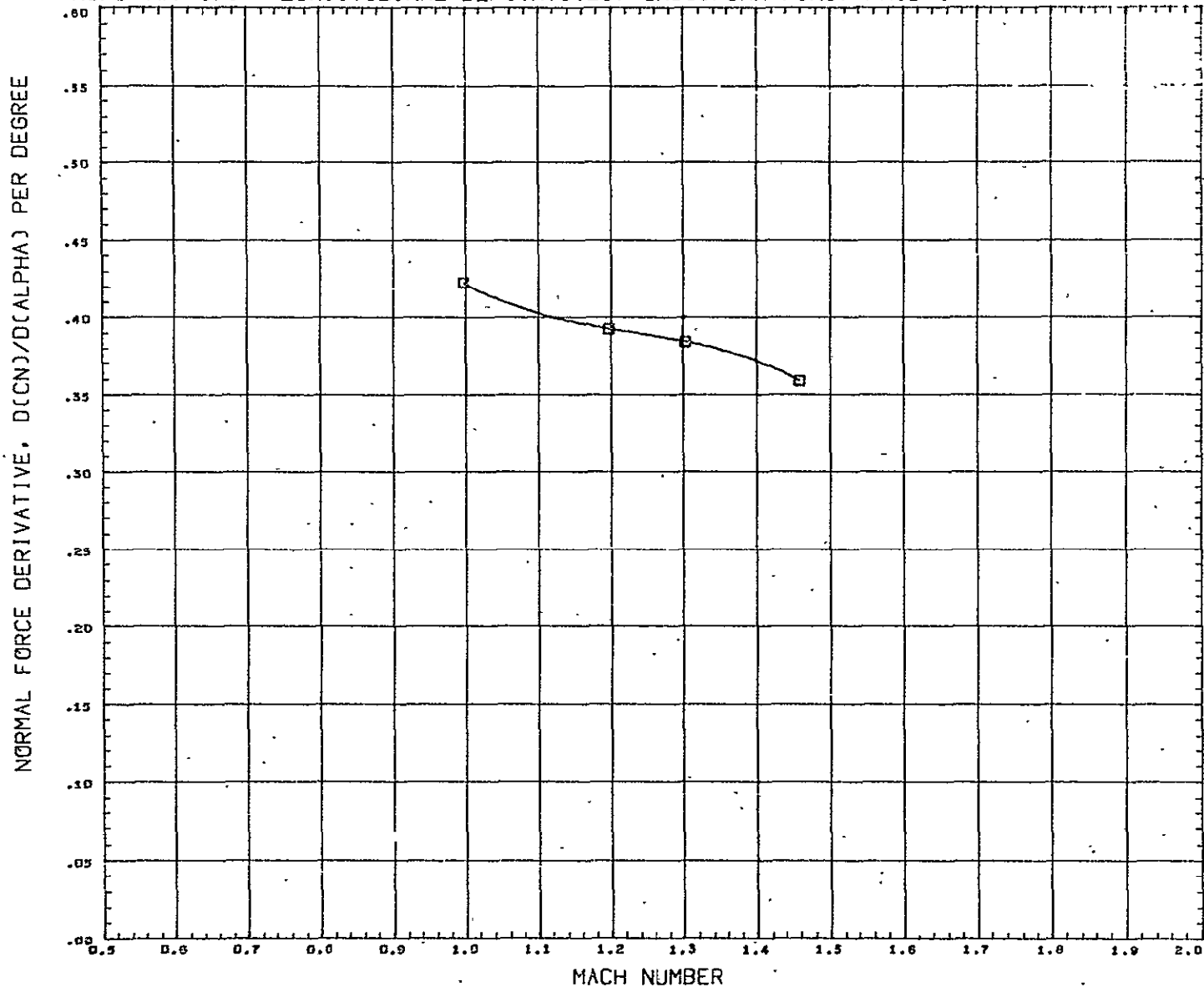
REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

TWT470 S-IC/GAC ORBITER BF20WHVS PHIB = 45

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MSFC TWT 470 LONGITUDINAL DERIVATIVES, CRUCIFORM FINS, PHIB=0



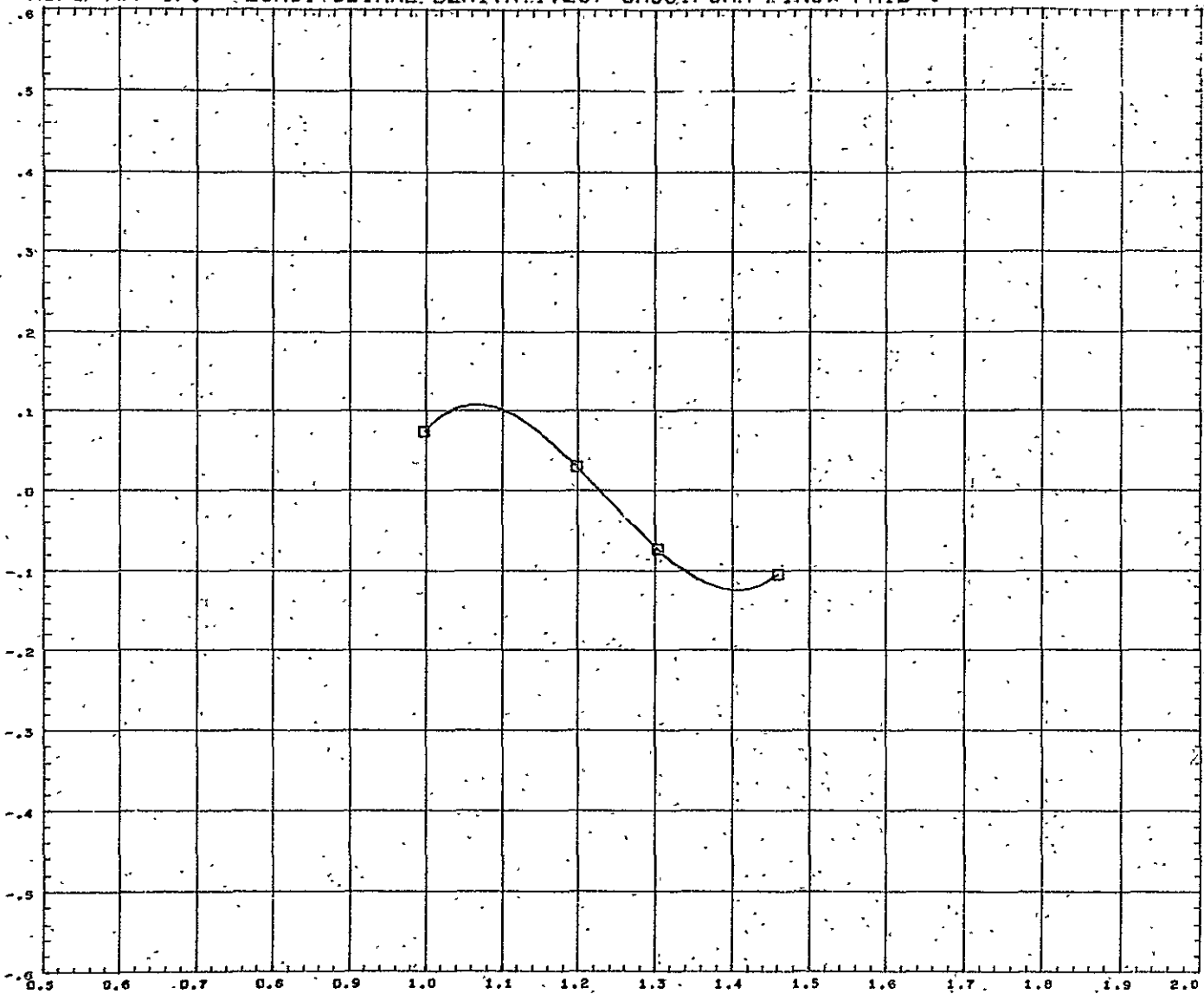
PARAMETRIC VALUES
 BETA - 0.050 ORBINC - 1.050
 WINGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YHRF 0.0000 INCHES
 ZHRF 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE V

MSFC TWT 470 LONGITUDINAL DERIVATIVES, CRUCIFORM FINS, PHIB=0

PITCHING MOMENT DERIVATIVE, $D(CLM)/D(\alpha)$ PER DEGREE



MACH. NUMBER

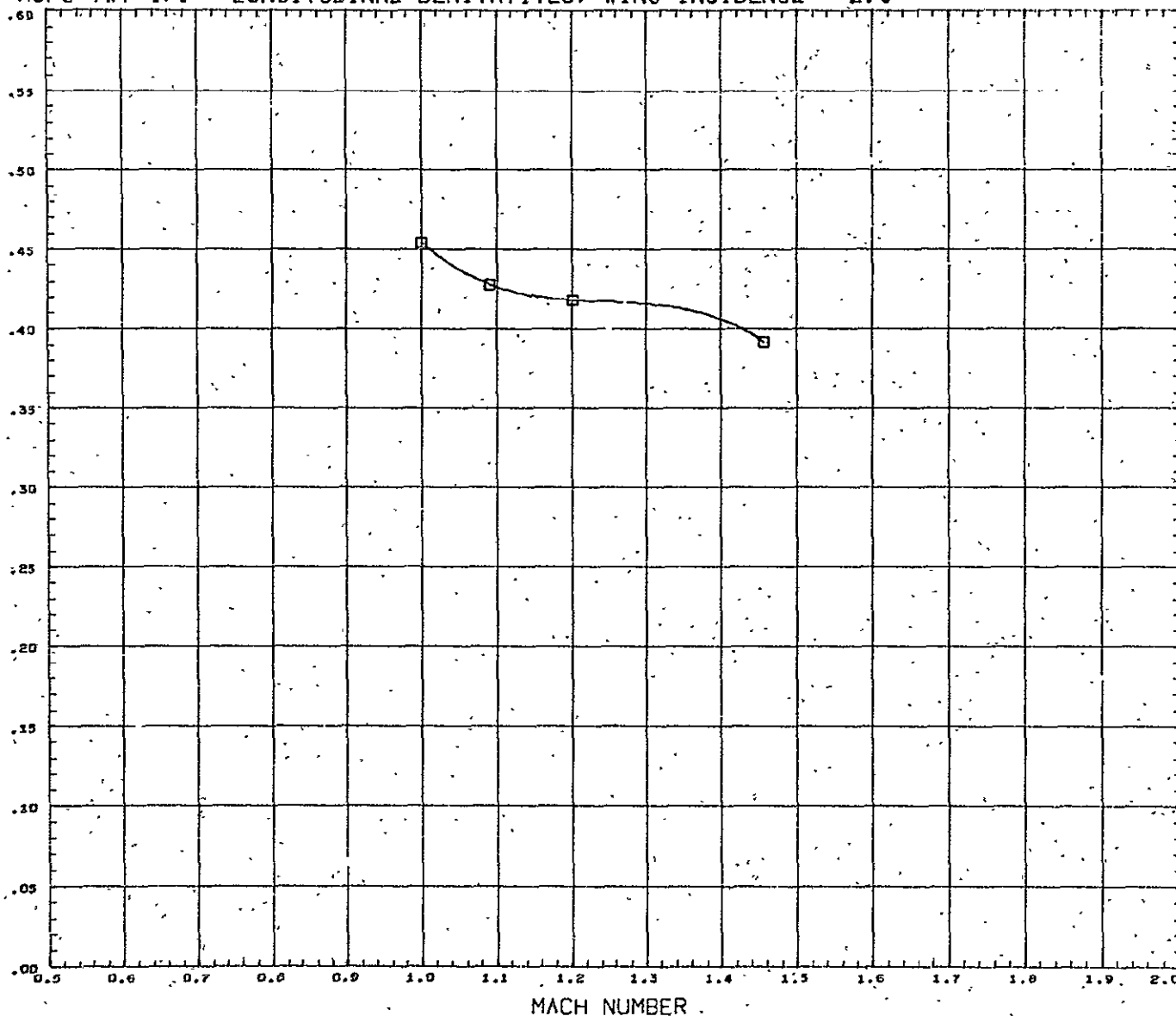
PARAMETRIC VALUES
 BETA - 0.060 ORBINC - 1.050
 WNGINC 4.000 HTAIL 0.000
 PHIB 0.000

DATA HIST. CODE V

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XHRP 5.2640 INCHES
 YHRP 0.0000 INCHES
 ZHRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

MSFC TWT 470 LONGITUDINAL DERIVATIVES, WING INCIDENCE = 2.0

NORMAL FORCE DERIVATIVE, $D(CN)/D(\alpha)$ PER DEGREE



MACH NUMBER

PARAMETRIC VALUES

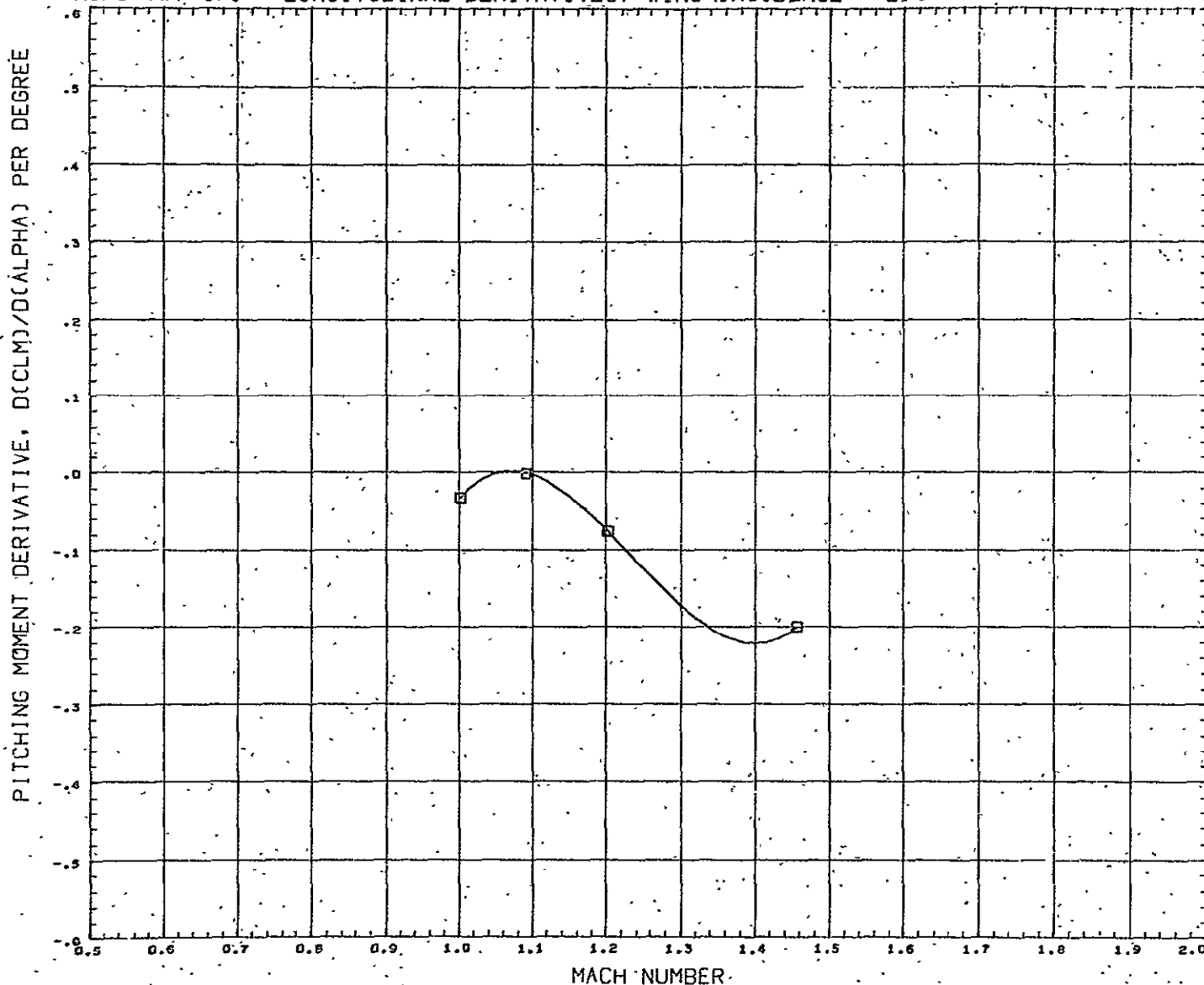
BETA 0.090 ORBINC 1.050
WINGINC 2.000 HTAIL 0.000
PHIB 0.000

REFERENCE INFORMATION

REFS 1.3960 SQ. IN.
REFL 1.3330 INCHES
REFB 1.3330 INCHES
XNRP 5.2640 INCHES
YNRP 0.0000 INCHES
ZMRP 0.0000 INCHES
SCALE 0.3366 PERCENT

DATA MIST. CODE V

MSFC TWT 470 LONGITUDINAL DERIVATIVES, WING INCIDENCE = 2.0

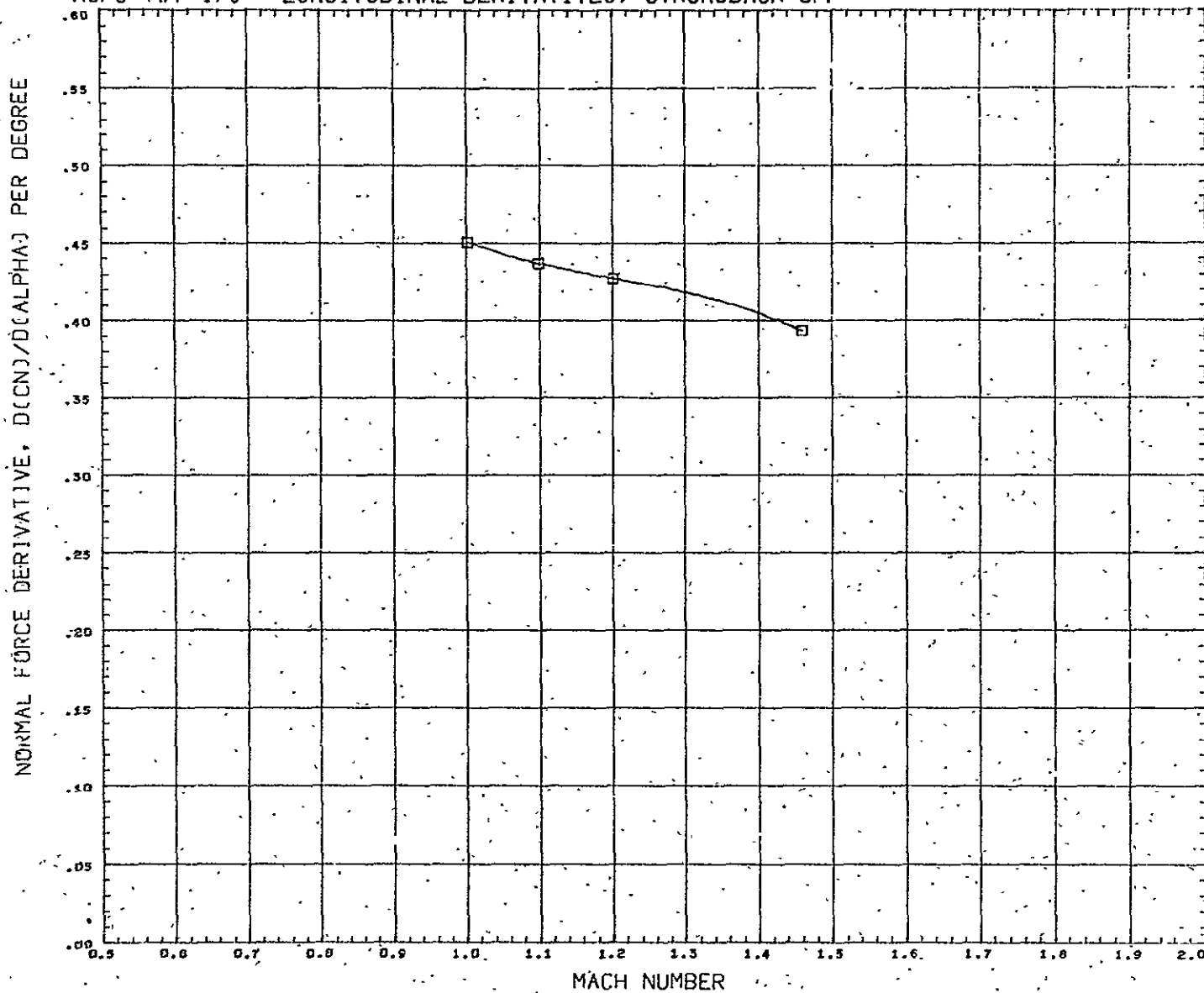


PARAMETRIC VALUES
 BETA - 0.090 ORBINC - 1.050
 WINGINC 2.000 HTAIL 0.000
 PHIB 0.000

DATA HIST. CODE V

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XHRP 5.2640 INCHES
 YHRP 0.0000 INCHES
 ZHRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

MSFC TWT 470 LONGITUDINAL DERIVATIVES, STRONGBACK OFF

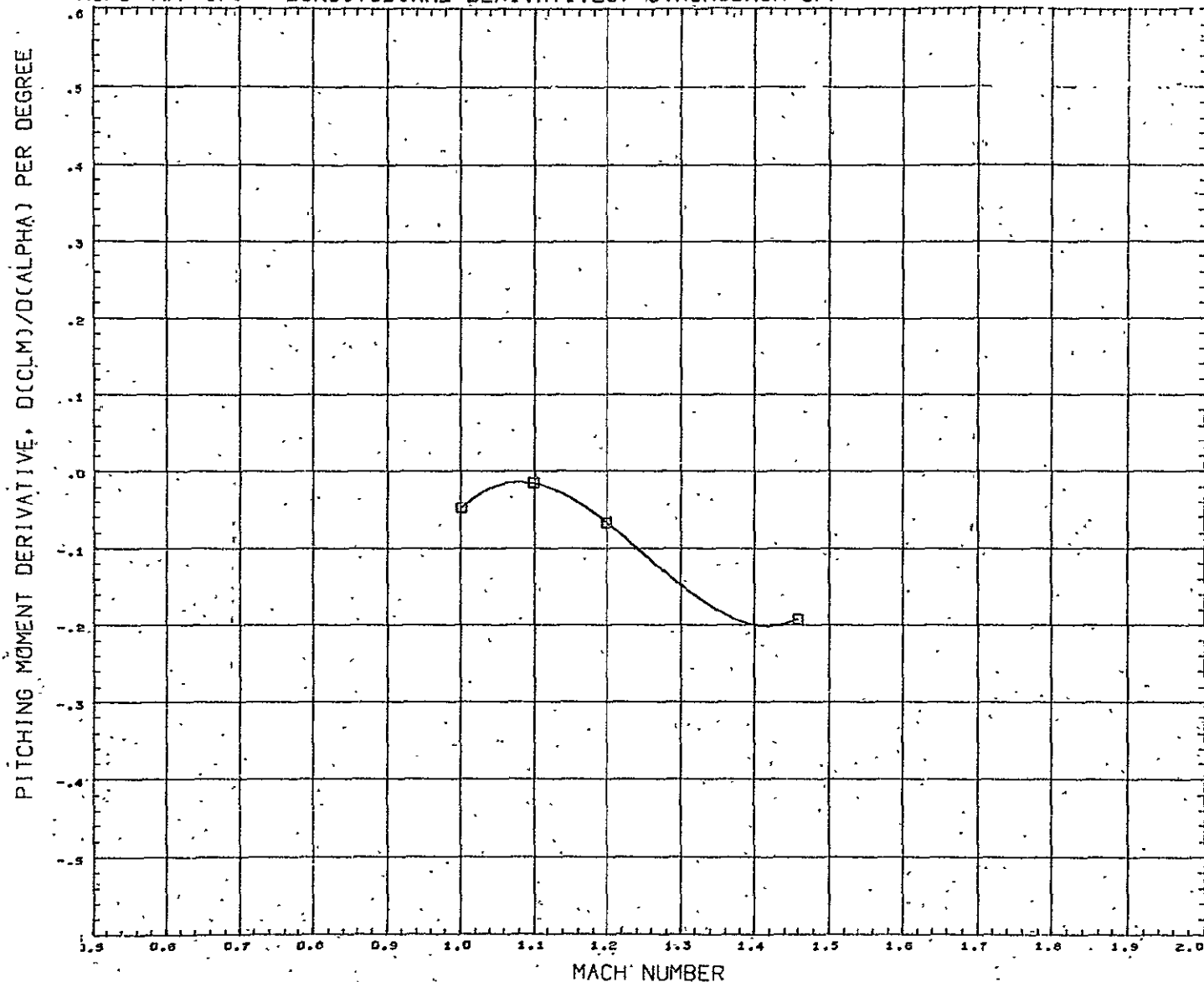


PARAMETRIC VALUES
 BETA - 0.040 ORBINC - 1.050
 WINGINC 4.000 HTAIL 0.000
 PHIB 0.000

DATA HIST. CODE Y

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

MSFC TWT 470 LONGITUDINAL DERIVATIVES, STRONGBACK OFF

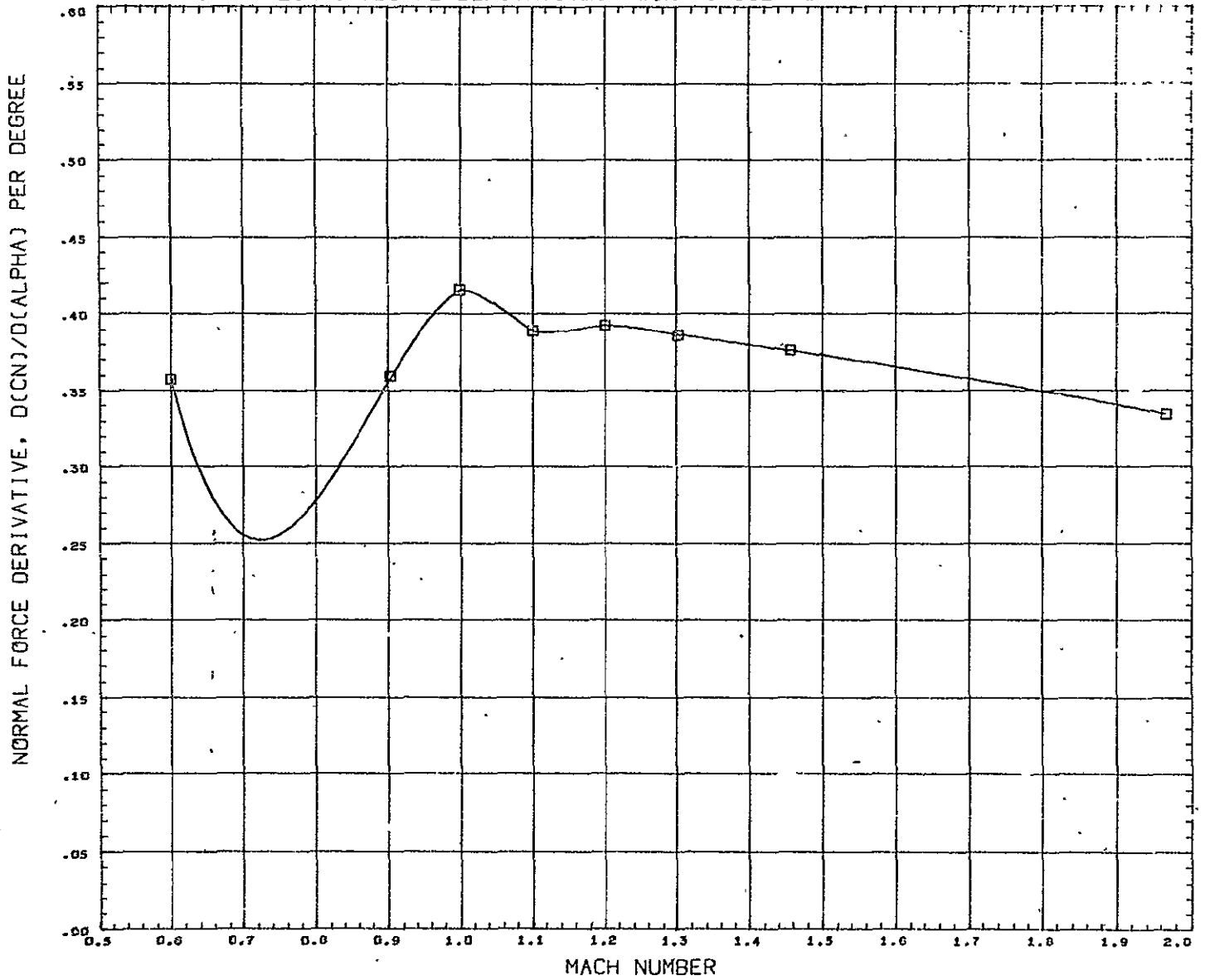


PARAMETRIC VALUES
 BETA 0.040 ORBINC 1.050
 WINGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE V

MSFC TWT 470 LONGITUDINAL DERIVATIVES, WING SPOILERS

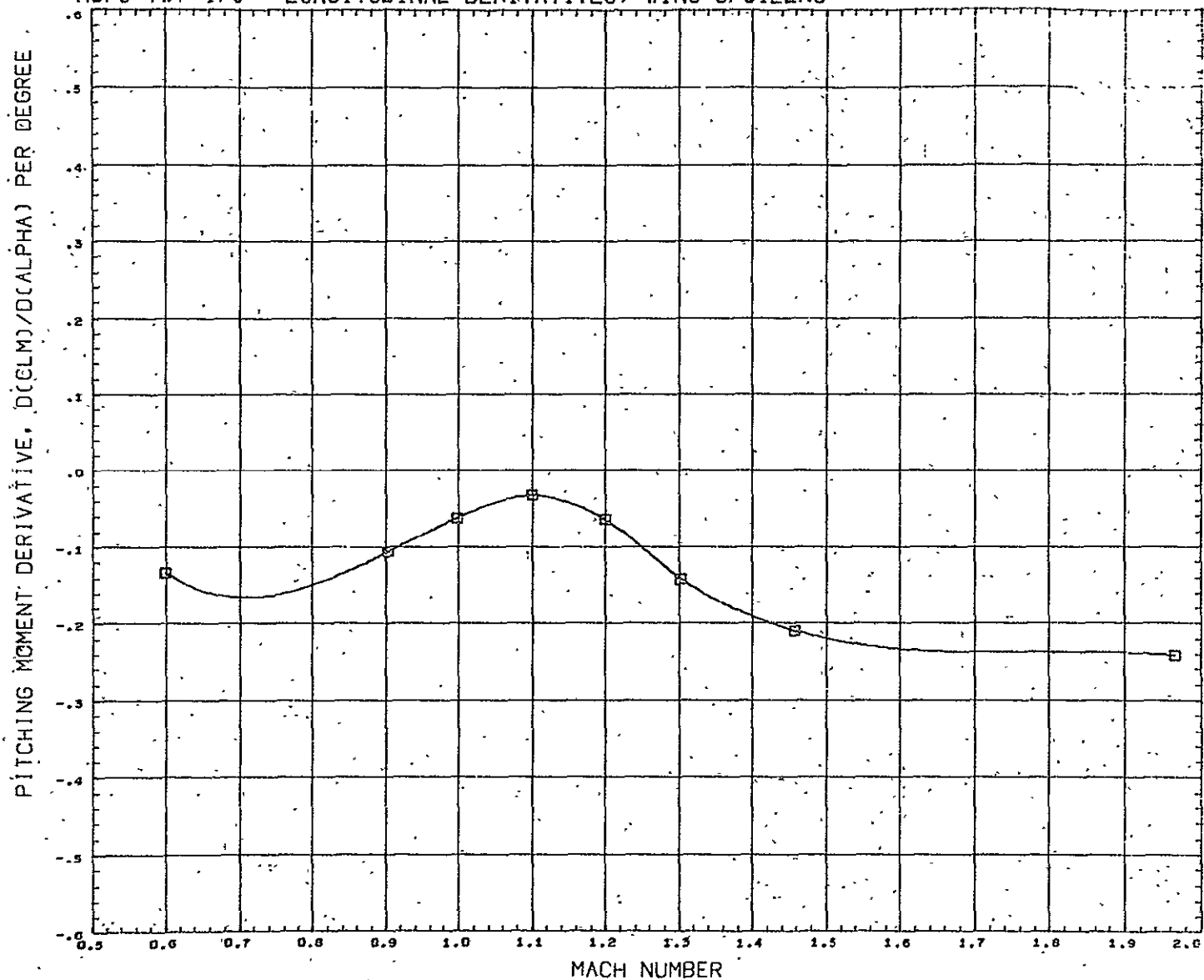


PARAMETRIC VALUES
 BETA - 0.050 ORBINC - 1.050
 WINGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XHRP 5.2640 INCHES
 YHRP 0.0000 INCHES
 ZHRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE V

MSFC TWT 470 LONGITUDINAL DERIVATIVES, WING SPOILERS



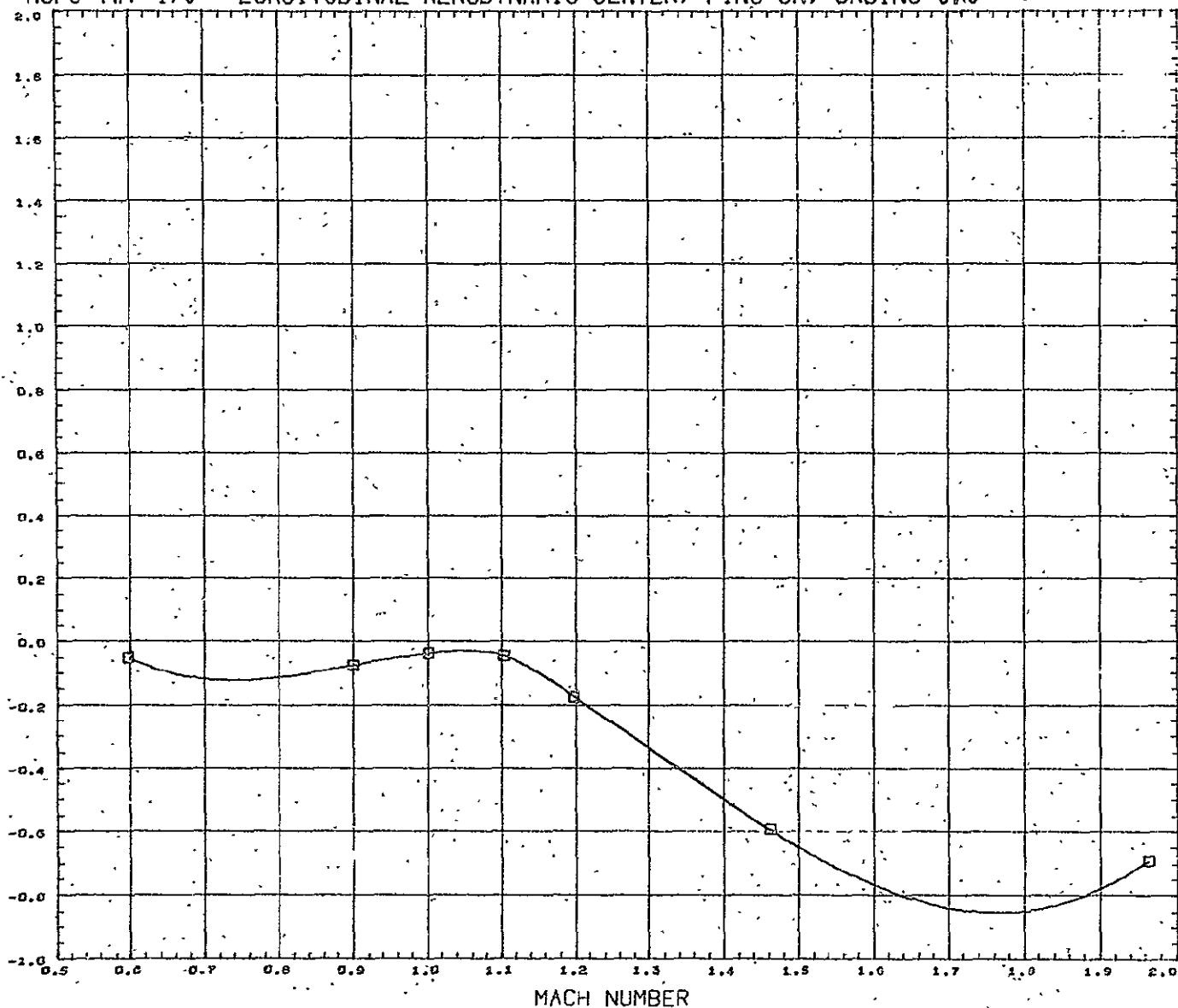
PARAMETRIC VALUES
 BETA - 0.050 ORBINC - 1.050
 WNGINC 4.000 HTAIL 0.000
 PHIB 0.000

DATA HIST. CODE V

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

MSFC TWT 470- LONGITUDINAL AERODYNAMIC CENTER, FINS ON, ORBINC=0.0

LOCATION OF LONGITUDINAL AERODYNAMIC CENTER, XAC/REFL FORWARD OF XMRP



PARAMETRIC VALUES

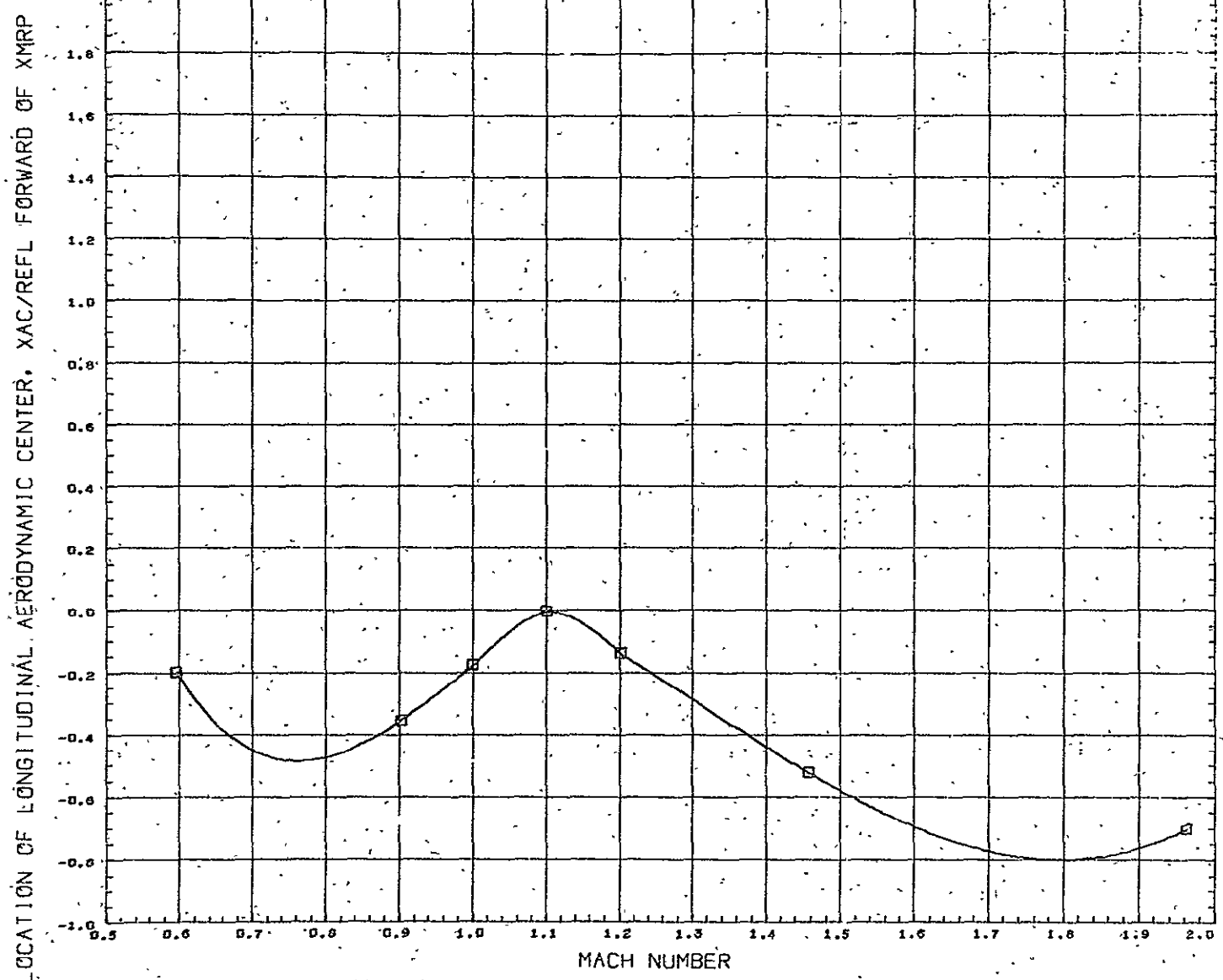
BETA - 0.070 ORBINC 0.000
WINGINC 4.000 HTAIL 0.000
PHIB 0.000

DATA HIST. CODE V

REFERENCE INFORMATION

REFS 1.3960 SQ. IN.
REFL 1.3330 INCHES
REFB 1.3330 INCHES
XMRP 5.2640 INCHES
YMRP 0.0000 INCHES
ZMRP 0.0000 INCHES
SCALE 0.3366 PERCENT

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, FINS ON, ORBINC=0.0



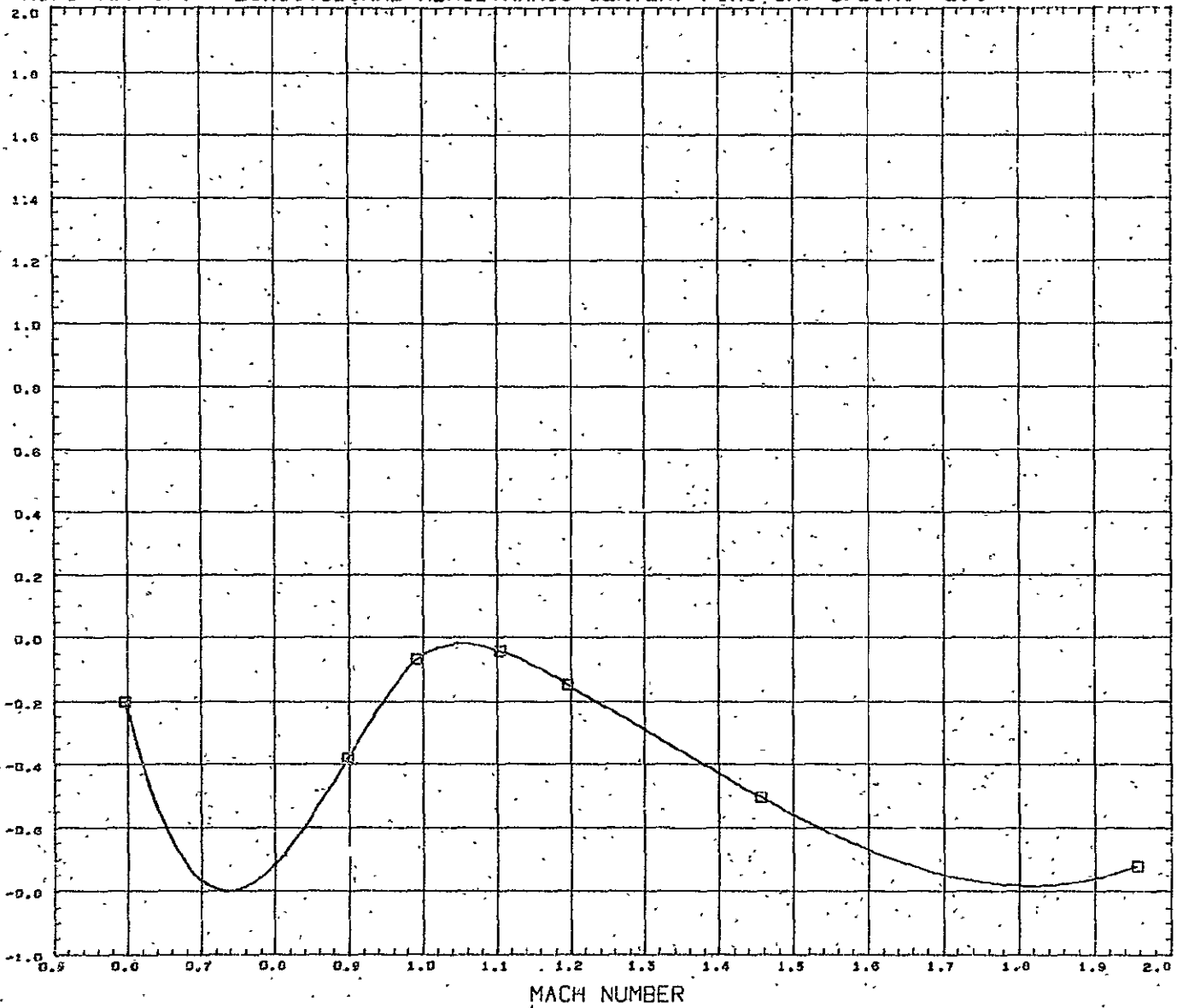
PARAMETRIC VALUES
 BETA = 0.090 ORBINC 0.000
 WINGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. INCH
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE V

LOCATION OF LONGITUDINAL AERODYNAMIC CENTER, XAC/REFL FORWARD OF XMRP

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, FINS ON, ORBINC=-2.0



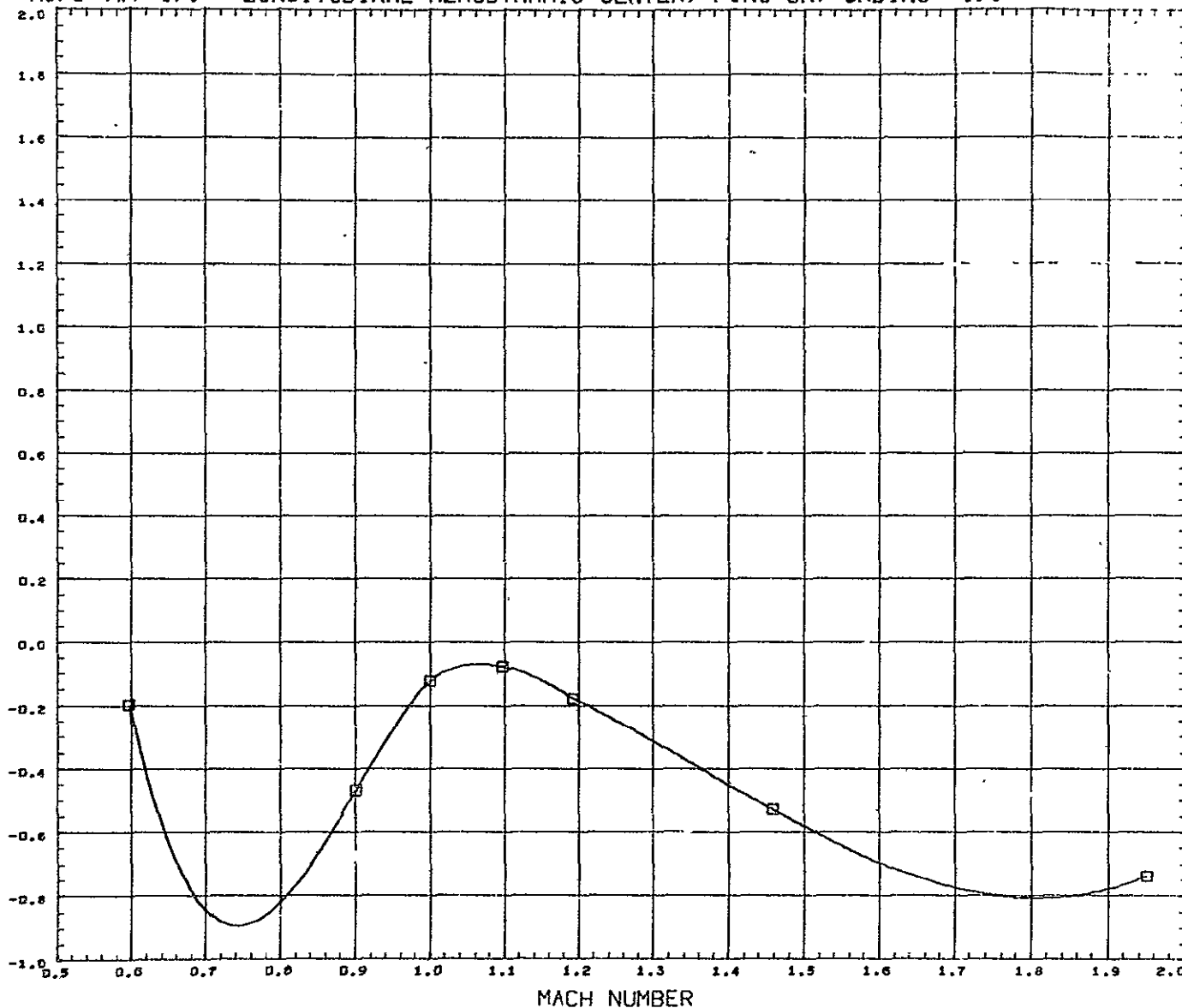
PARAMETRIC VALUES
 BETA 0.070 ORBINC - 2.000
 WINGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE V

LOCATION OF LONGITUDINAL AERODYNAMIC CENTER, XAC/REFL FORWARD OF XMRP

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, FINS ON, ORBINC=-4.0



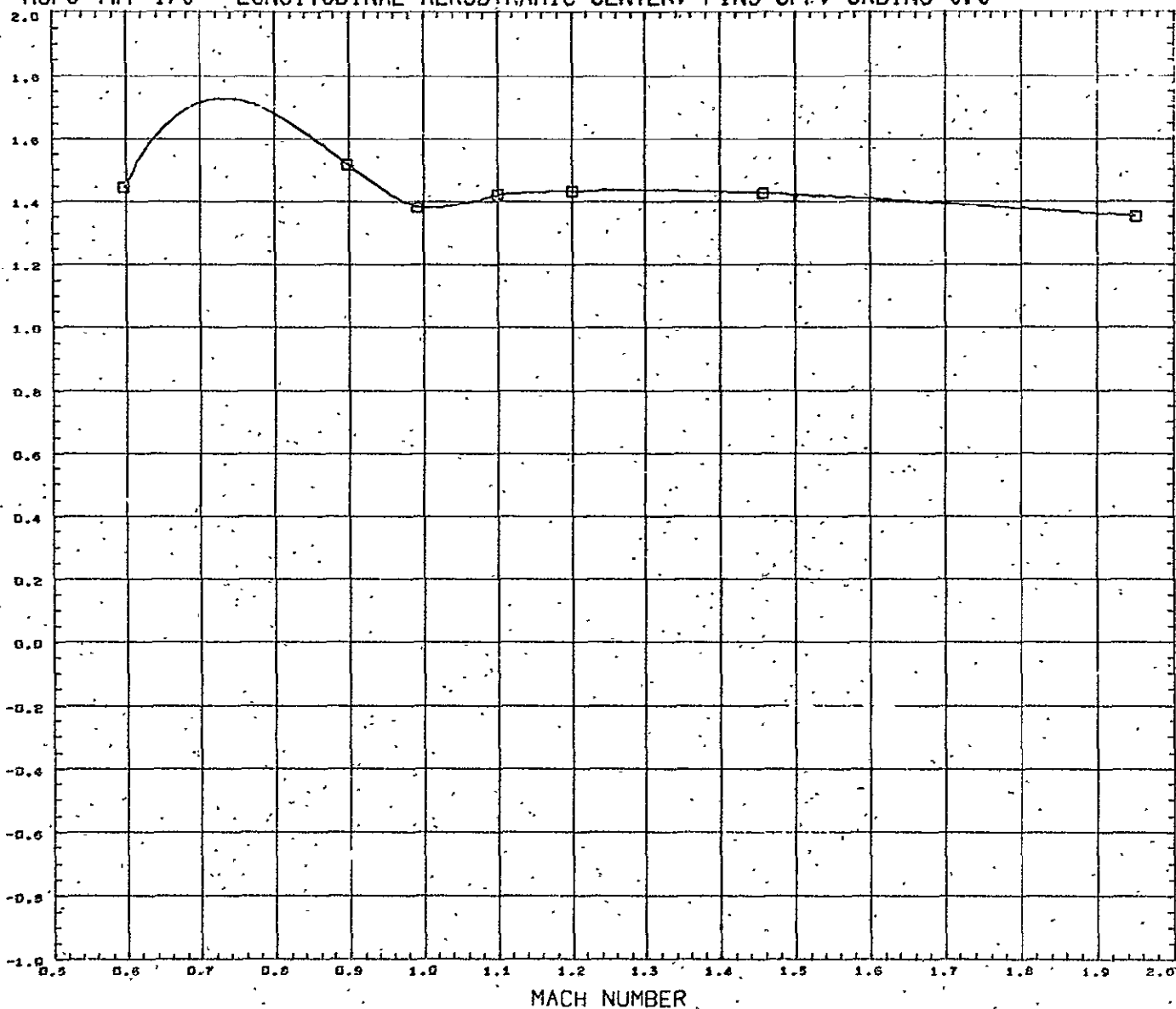
PARAMETRIC VALUES
 BETA - 0.050 ORBINC - 4.000
 WINGINC 4.000 HTAIL 0.000
 PHIB 0.000

DATA HIST. CODE V

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, FINS OFF, ORBINC=0.0

LOCATION OF LONGITUDINAL AERODYNAMIC CENTER, XAC/REFL FORWARD OF XMRP



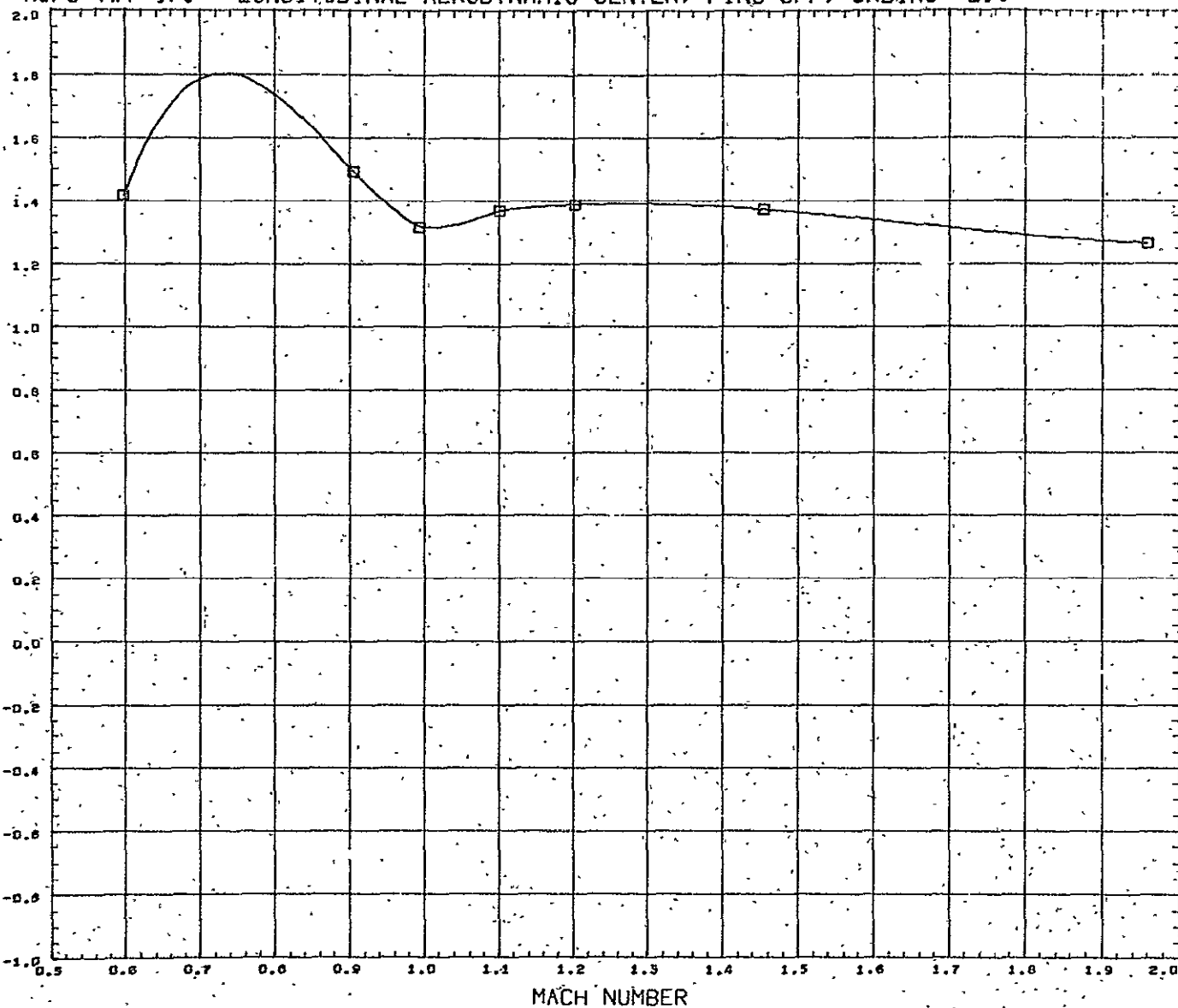
PARAMETRIC VALUES
 BETA = 0.050 ORBINC 0.000
 WNGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS -1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE : V

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, FINS OFF, ORBINC=-2.0

LOCATION OF LONGITUDINAL AERODYNAMIC CENTER, XAC/REFL FORWARD OF XMRP



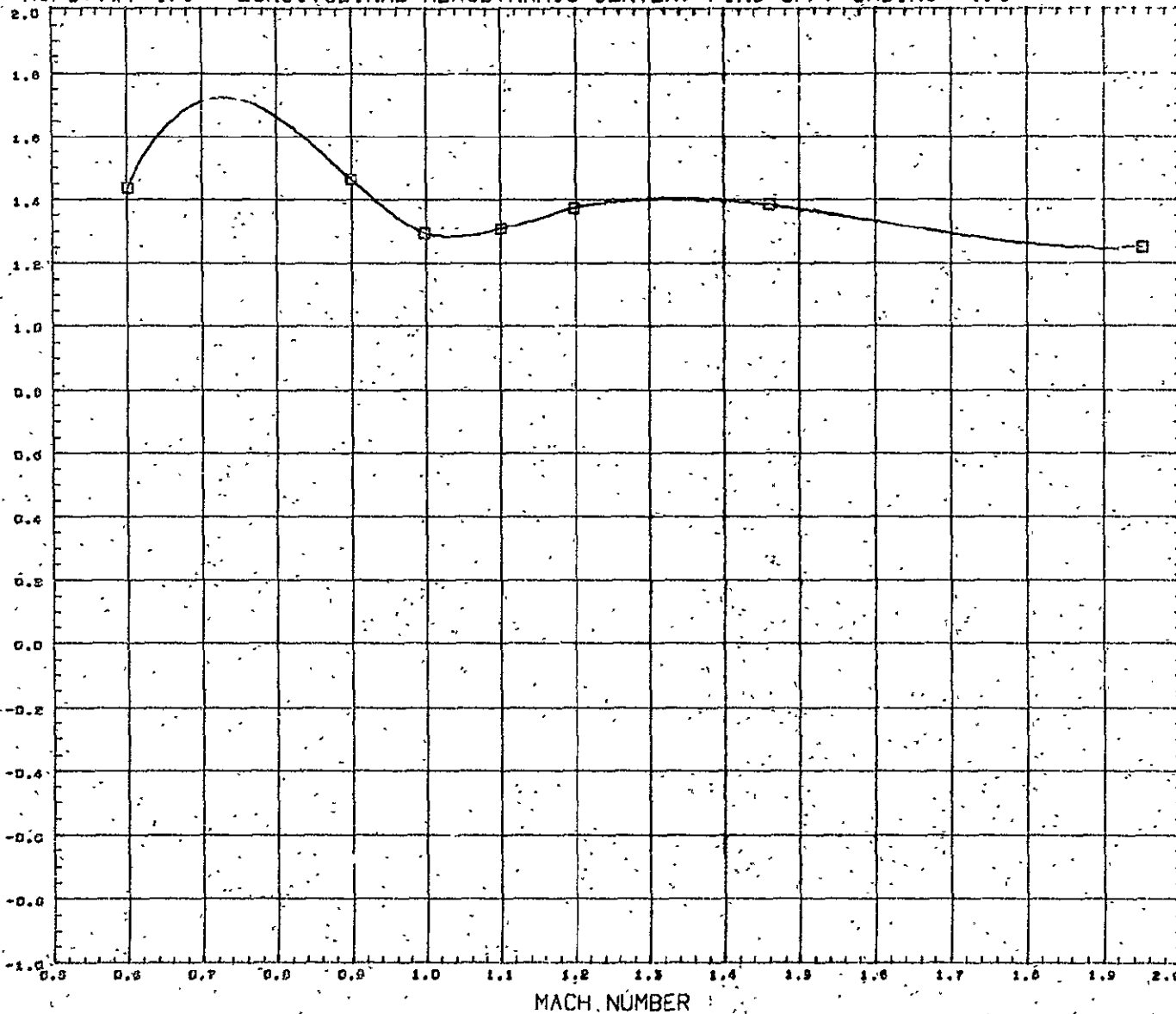
PARAMETRIC VALUES
 BETA 0.080 ORBINC 2.000
 WINGINC 4.000 HTAIL 0.000
 PHIB 0.000

DATA HIST. CODE V

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

LOCATION OF LONGITUDINAL AERODYNAMIC CENTER. XAC/REFL FORWARD OF XMRP

MSFC PWL 470 LONGITUDINAL AERODYNAMIC CENTER. FINS OFF, ORBINC=-4.0



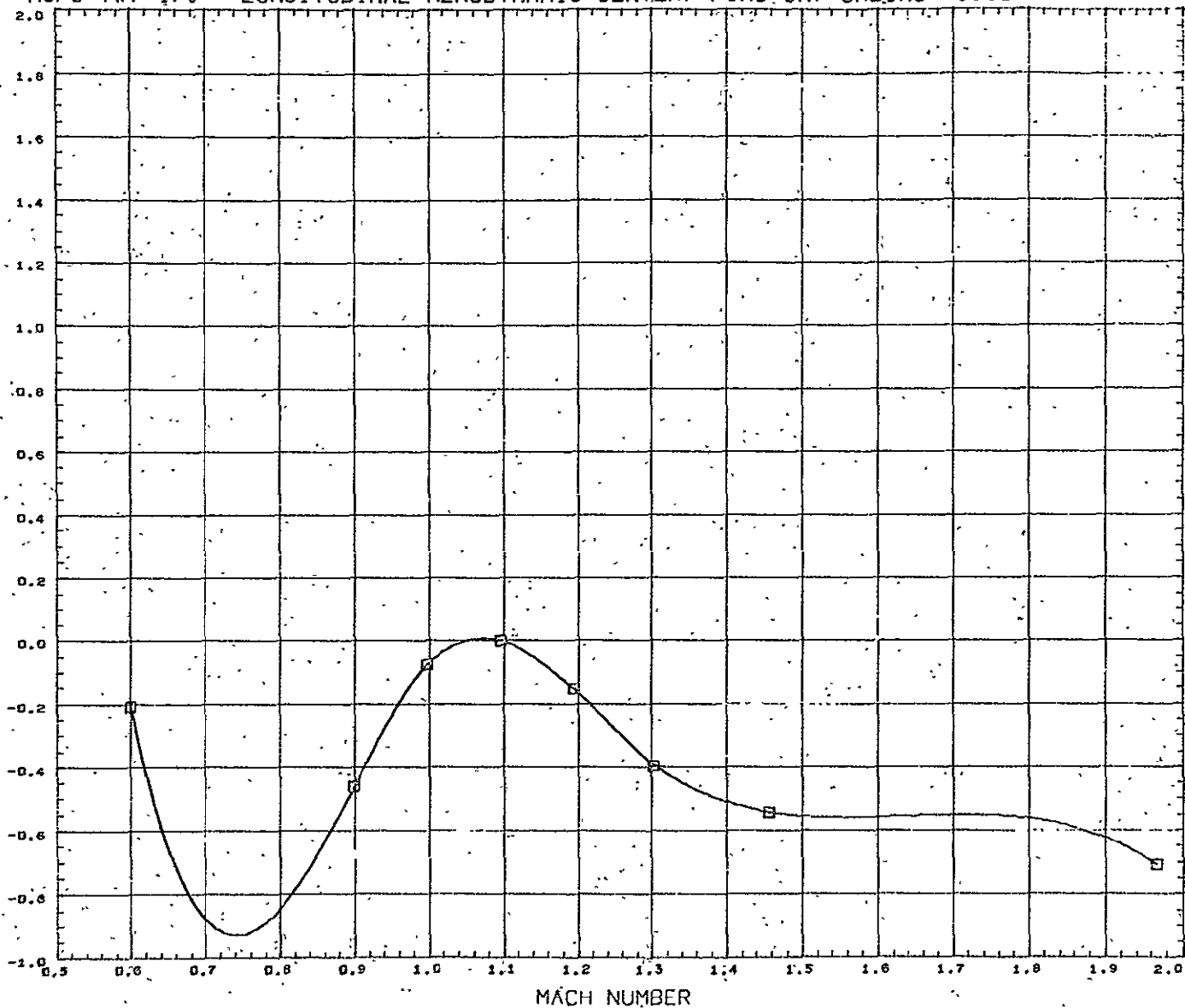
PARAMETRIC VALUES
 BETA - 0.040 ORBINC - 4.000
 WINGINC - 4.000 HTAIL - 0.000
 PHIB - 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE V

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, FINS ON, ORBINC=-1.05

LOCATION OF LONGITUDINAL AERODYNAMIC CENTER, XAC/REFL FORWARD OF XMRP



PARAMETRIC VALUES

BETA - 0.050 ORBINC - 1.050
WNGINC 4.000 HTAIL 0.000
PHIB 0.000

DATA HIST. CODE V

REFERENCE INFORMATION

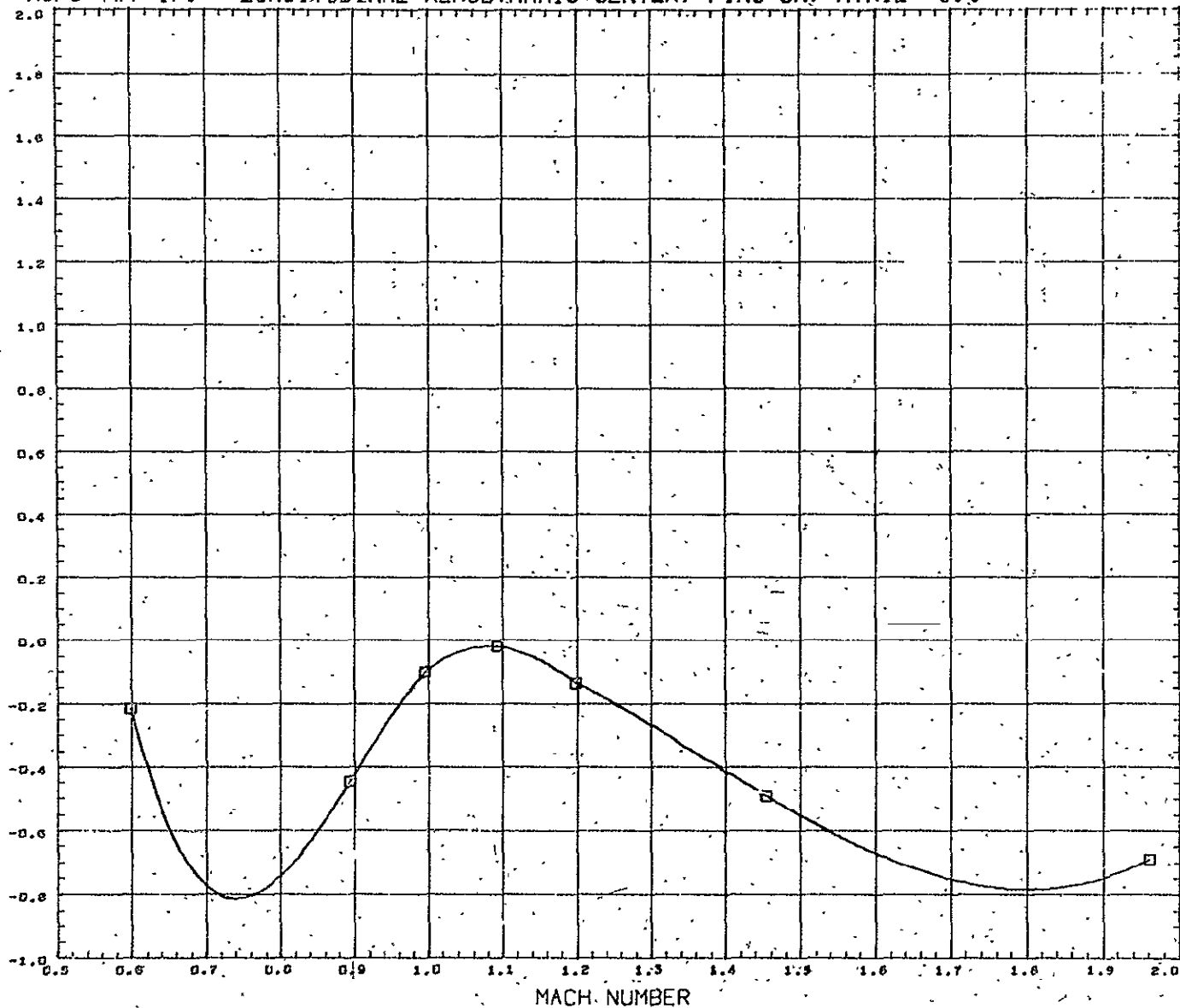
REFS	1.3960	sq. in.
REFL	1.3330	inches
REFB	1.3330	inches
XMRP	5.2640	inches
YMRP	0.0000	inches
ZMRP	0.0000	inches
SCALE	0.3366	PERCENT

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

(V24081) 29 JAN 71 PAGE 214

LOCATION OF LONGITUDINAL AERODYNAMIC CENTER, XAC/REFL FORWARD OF XMRP

MSFC TWT 470 · LONGITUDINAL AERODYNAMIC CENTER, FINS ON, HTAIL=-5.0



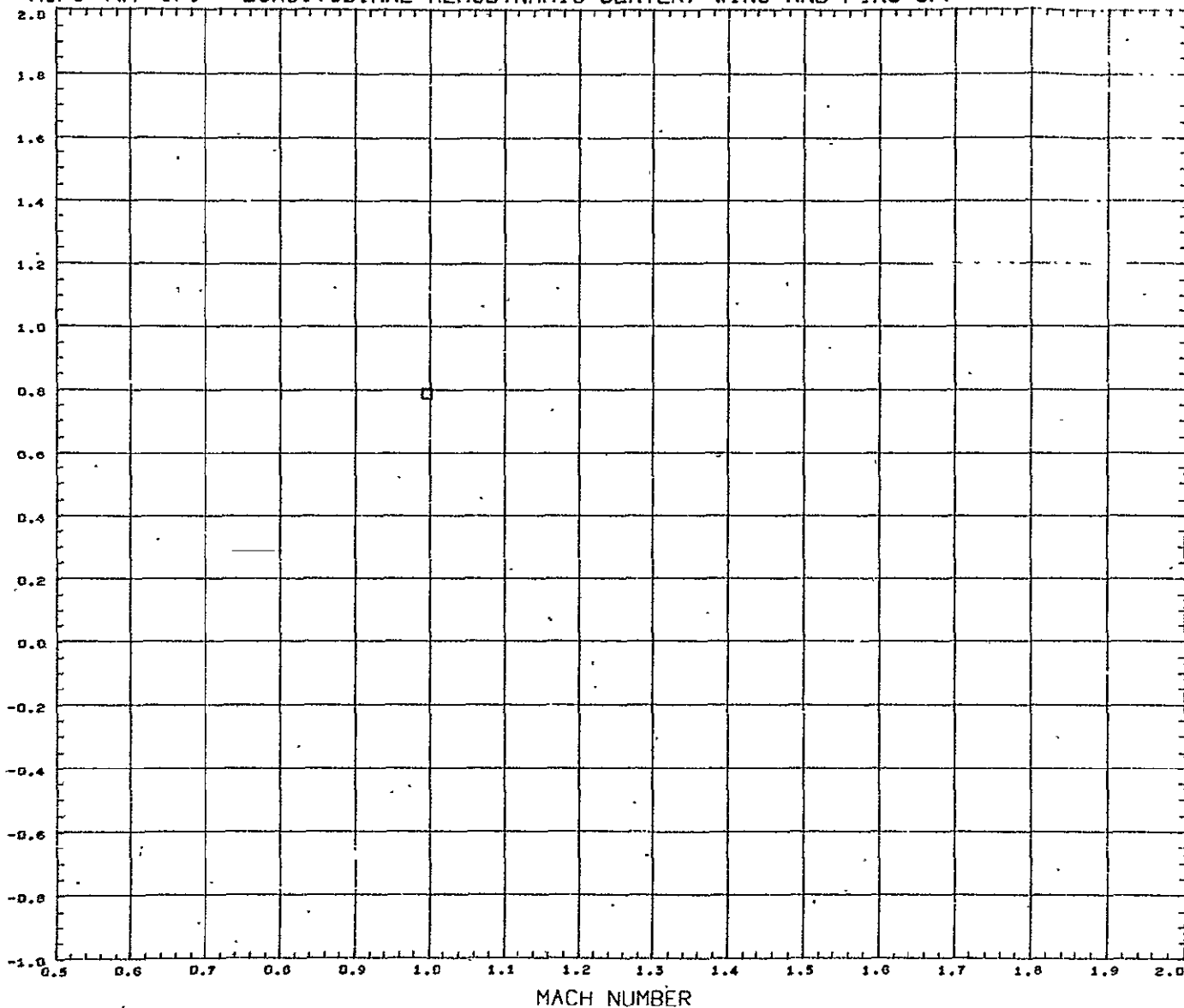
PARAMETRIC VALUES
 BETA - 0.020 ORBINC - 1.030
 WNGINC - 4.000 HTAIL - 5.000
 PHIB 0.000

DATA HIST. CODE V.

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFS 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3365 PERCENT

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, WING AND FINS OFF

LOCATION OF LONGITUDINAL AERODYNAMIC CENTER, XAC/REFL FORWARD OF XMRP



PARAMETRIC VALUES
 BETA - 0.100 ORBINC - 1.050
 NTAIL 0.000 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE V

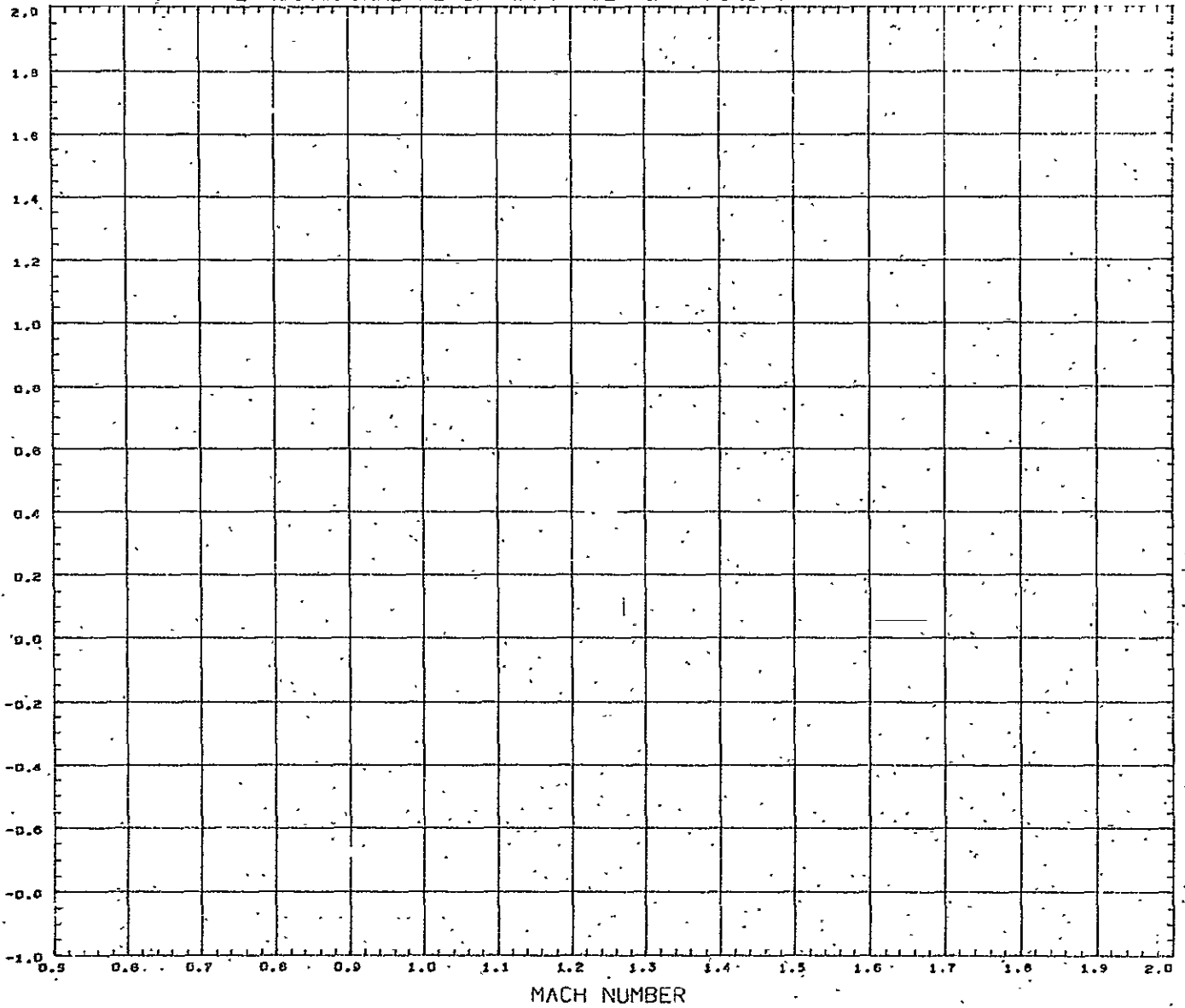
TWT470 S-IC/GAC ORBITER BOHVS

WING, FINS OFF (V24101) 29 JAN 71

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MSFC TWT 470 - LONGITUDINAL AERODYNAMIC CENTER, WING OFF

LOCATION OF LONGITUDINAL AERODYNAMIC CENTER, XAC/REFL FORWARD OF XMRP



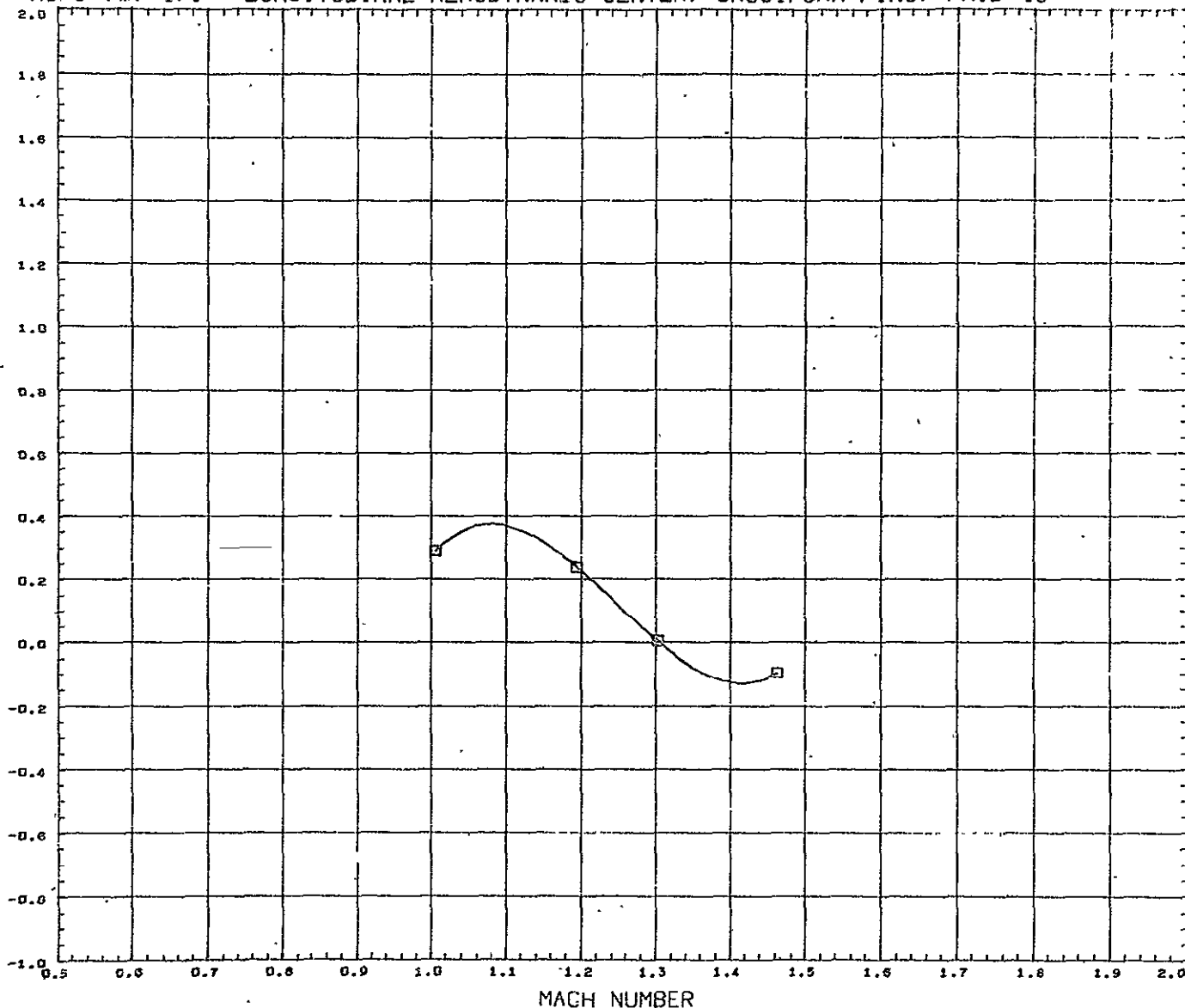
PARAMETRIC VALUES
 BETA - 0.100 ORBINC - 1.050
 HTAIL 0.000 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE V

LOCATION OF LONGITUDINAL AERODYNAMIC CENTER, XAC/REFL FORWARD OF XMRP

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, CRUCIFORM FINS, PHIB=45



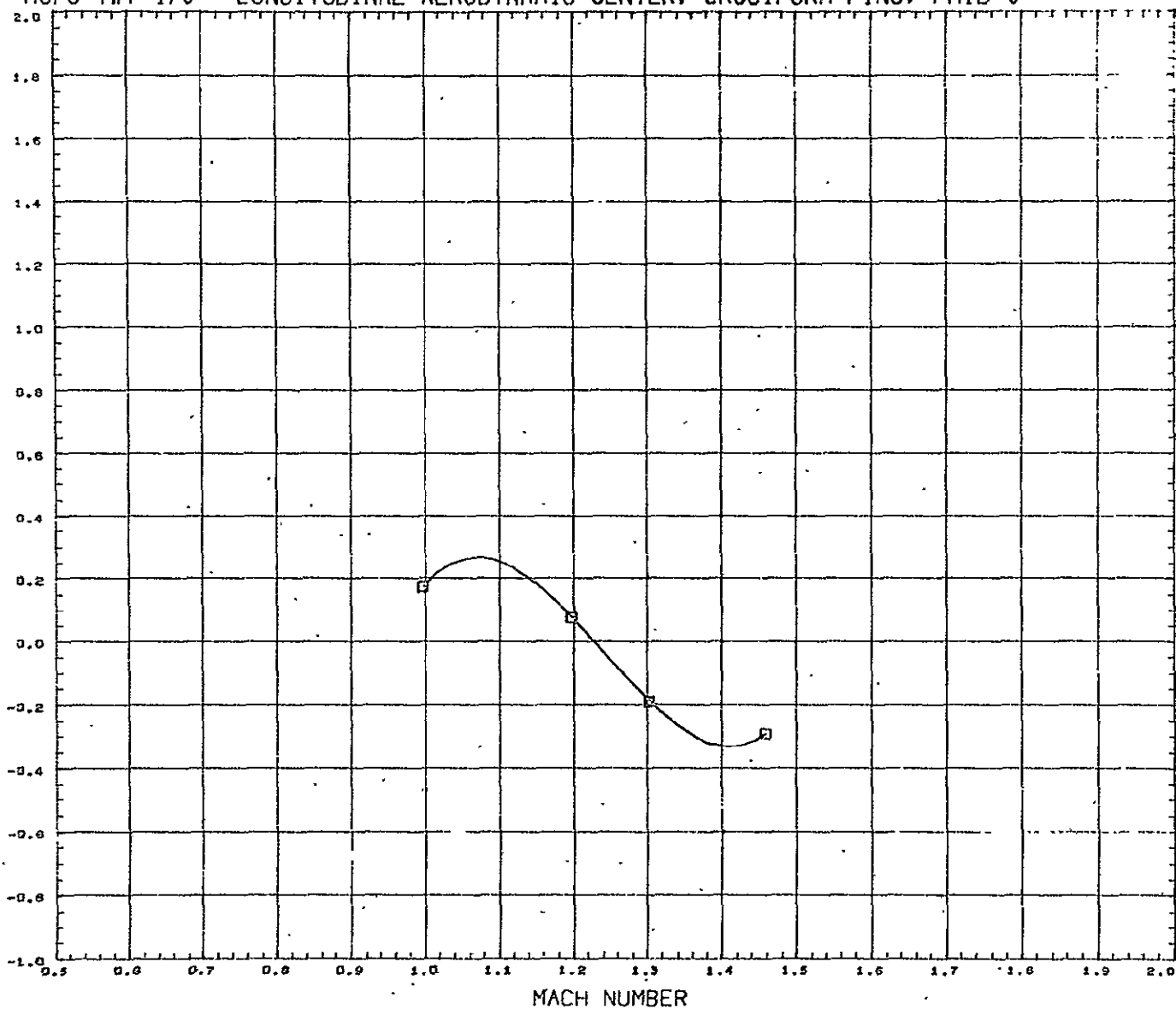
PARAMETRIC VALUES
 BETA - 0.070 ORBINC - 1.050
 WNGINC 4.000 HTAIL 0.000
 PHIB 45.000

DATA HIST. CODE V

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, CRUCIFORM FINS, PHIB=0

LOCATION OF LONGITUDINAL AERODYNAMIC CENTER, XAC/REFL FORWARD OF XMRP



PARAMETRIC VALUES

BETA = 0.060 ORBINC = 1.050
WINGINC = 4.000 HTAIL = 0.000
PHIB = 0.000

REFERENCE INFORMATION

REFS 1.3960 SQ. IN.
REFL 1.3330 INCHES
REFB 1.3330 INCHES
XMRP 5.2640 INCHES
YMRP 0.0000 INCHES
ZMRP 0.0000 INCHES
SCALE 0.3366 PERCENT

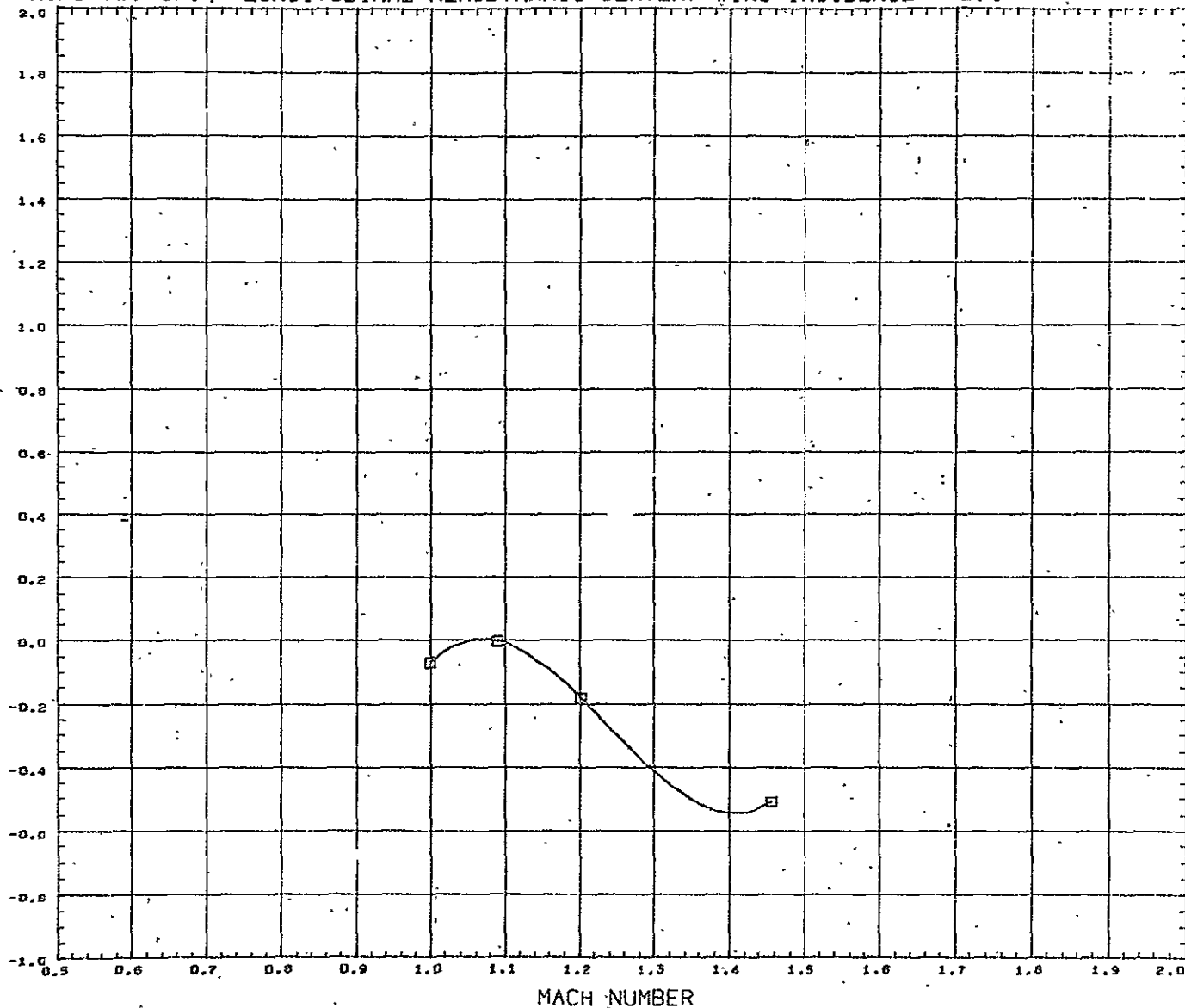
DATA HIST. CODE V

TWT470 S-IC/GAC ORBITER BF20WHVS PHIB = 0

(V24131) 29 JAN 71 PAGE 219

MSFC TWT 470. LONGITUDINAL AERODYNAMIC CENTER, WING INCIDENCE = 2.0

LOCATION OF LONGITUDINAL AERODYNAMIC CENTER, XAC/REFL FORWARD OF XMRP



MACH NUMBER

PARAMETRIC VALUES

BETA	- 0.090	ORBINC	- 1.050
WNGINC	2.000	NTAIL	0.000
PHIB	0.000		

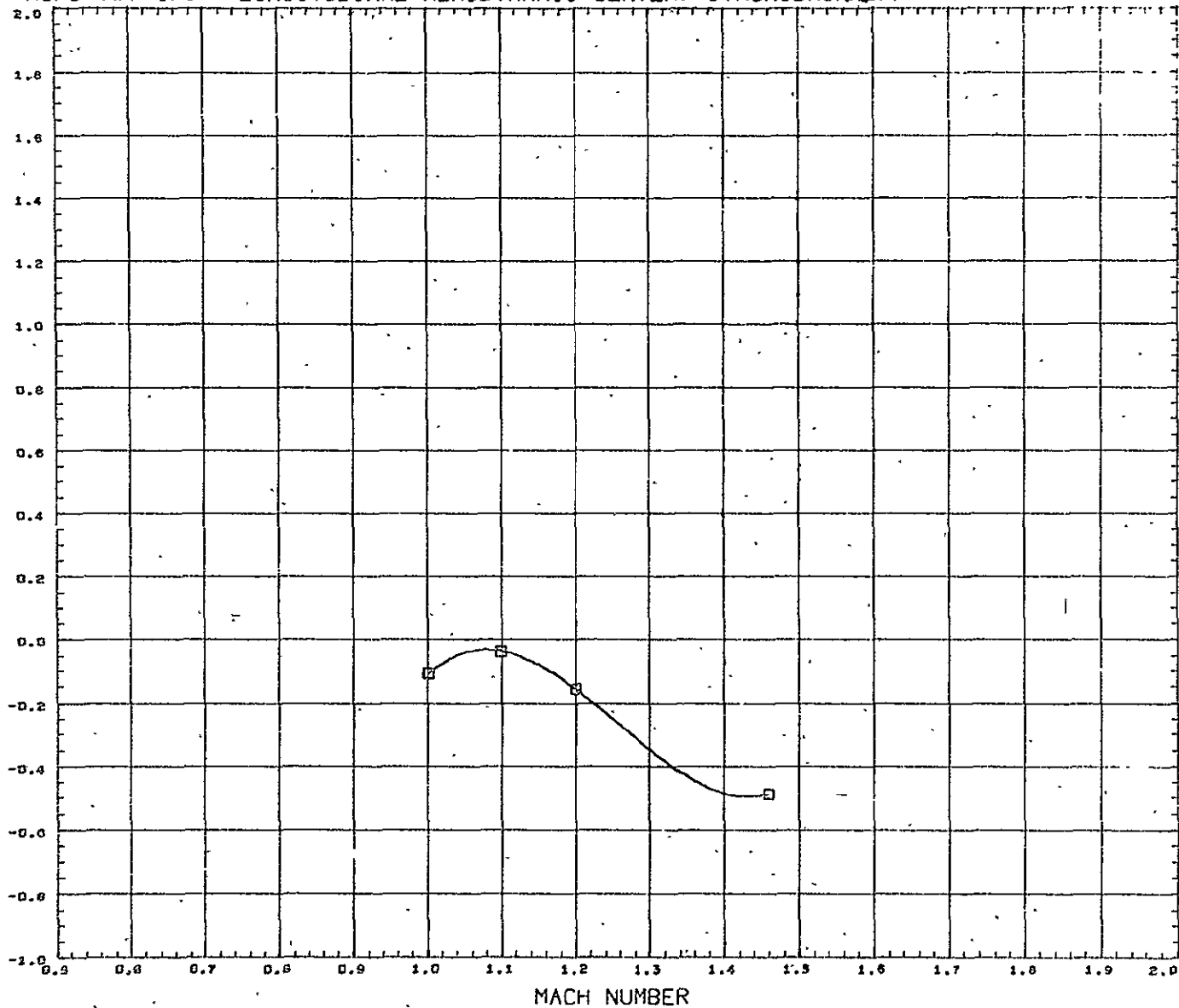
REFERENCE INFORMATION

REFS	1.3966	50. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCNT

DATA HIST. CODE V

LOCATION OF LONGITUDINAL AERODYNAMIC CENTER, XAC/REFL FORWARD OF XMRP

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, STRONGBACK OFF



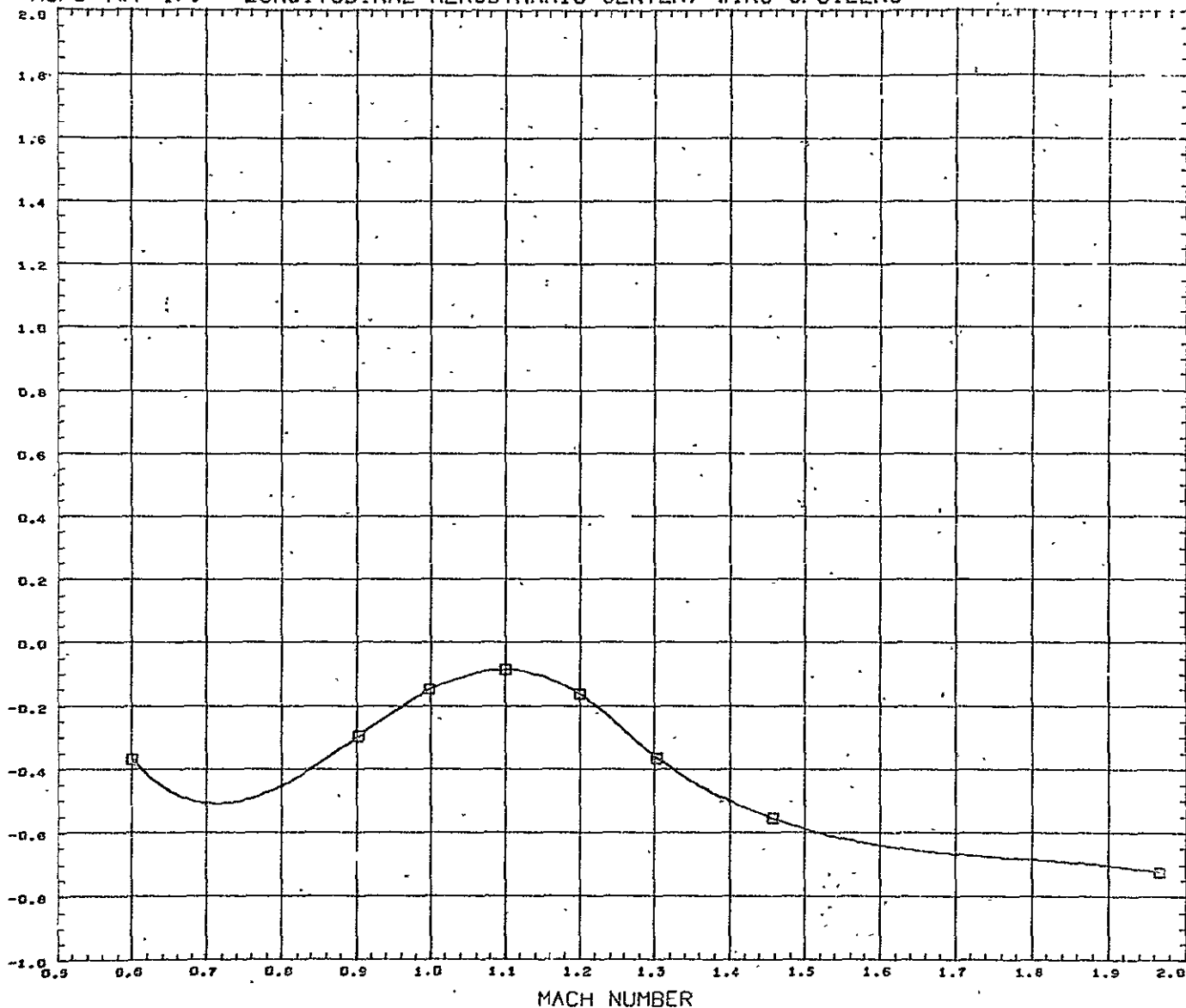
PARAMETRIC VALUES
 BETA - 0.040 ORBINC - 1.050
 WINGINC 4.000 HTAIL 0.000
 FHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ.IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE V

MSFC TWT 470 LONGITUDINAL AERODYNAMIC CENTER, WING SPOILERS

LOCATION OF LONGITUDINAL AERODYNAMIC CENTER, XAC/REFL FORWARD OF XMRP

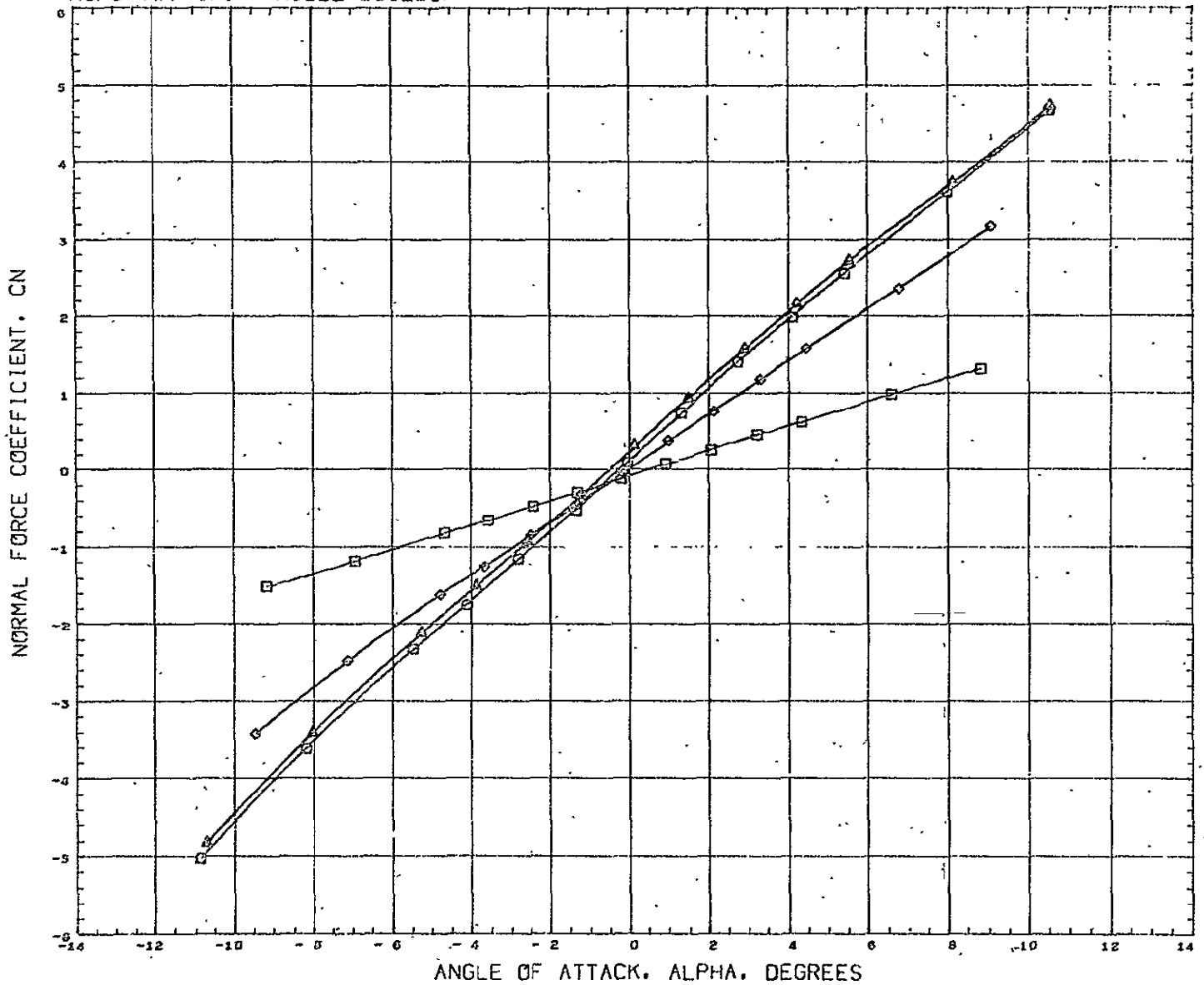


PARAMETRIC VALUES
 BETA - 0.050 ORBINC - 1.050
 WINGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3380 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

DATA HIST. CODE V

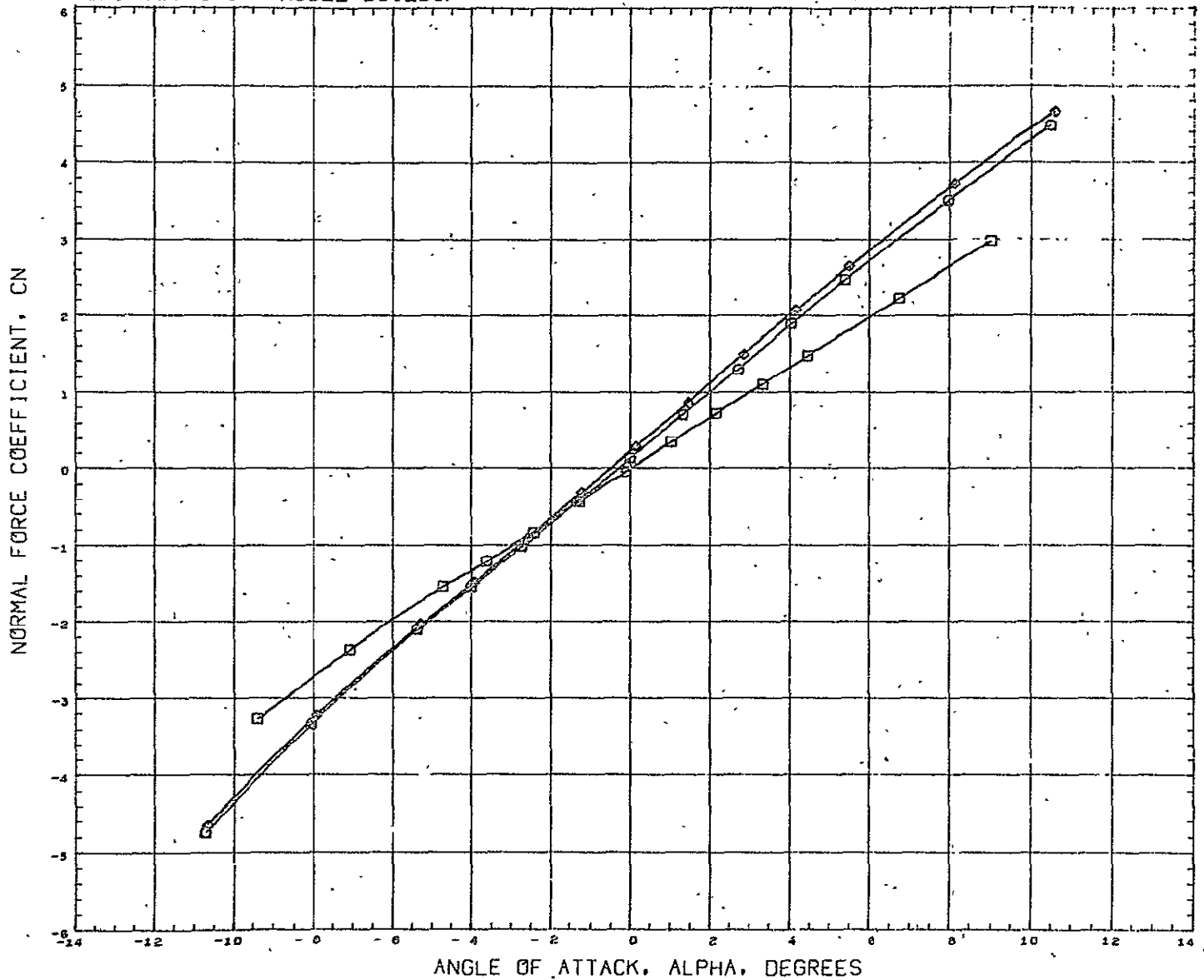
MSFC TWT 470 MODEL BUILDUP



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(X24001)	TWT470 S-1C/GAC ORBITER BF10MHVS	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ. IN.
(A24101)	TWT470 S-1C/GAC ORBITER BONYS WING, FINS OFF	WNGINC 4.000 HTAIL 0.000	REFL 1.3330 INCHES
(X24111)	TWT470 S-1C/GAC ORBITER BF10MHVS WING OFF	PHIB 0.000	REFB 1.3330 INCHES
(X24151)	TWT470 S-1C/GAC ORBITER BF10MHV		XNRP 5.2640 INCHES
			YNRP 0.0000 INCHES
			ZMRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 0.997

MSFC TWT 470 MODEL BUILDUP



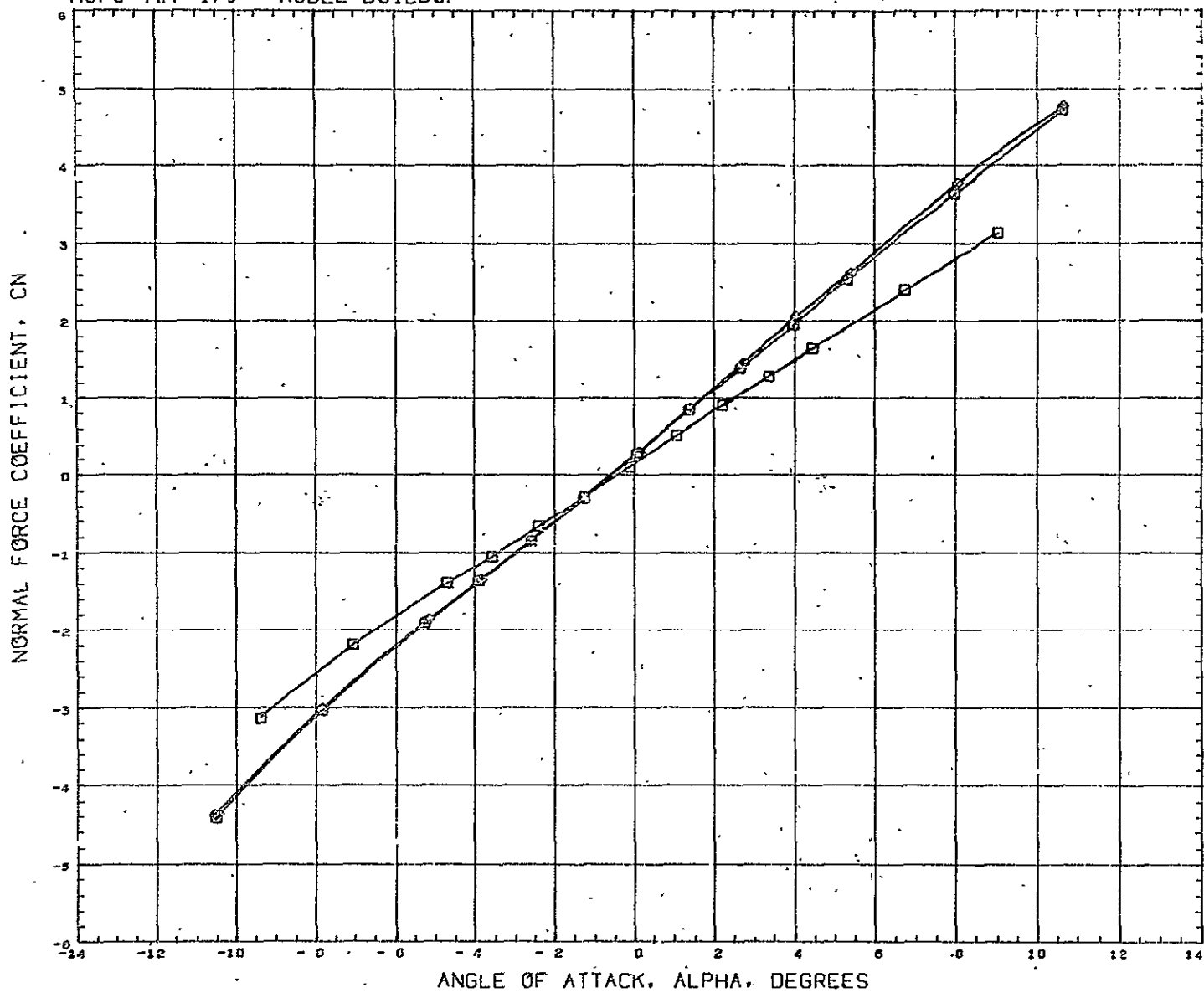
DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (824081) □ TWT470 S-1C/GAC ORBITER BF10WHVS BASIC
 (824111) □ TWT470 S-1C/GAC ORBITER BF10WHVS WING OFF
 (824151) ◇ TWT470 S-1C/GAC ORBITER BF10WHV STRONGBACK OFF

PARAMETRIC VALUES
 BETA - 0.050 ORBINC - 1.050
 WNGINC 4.000 HTAIL 0.000
 PHIB' 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

MACH 1.095

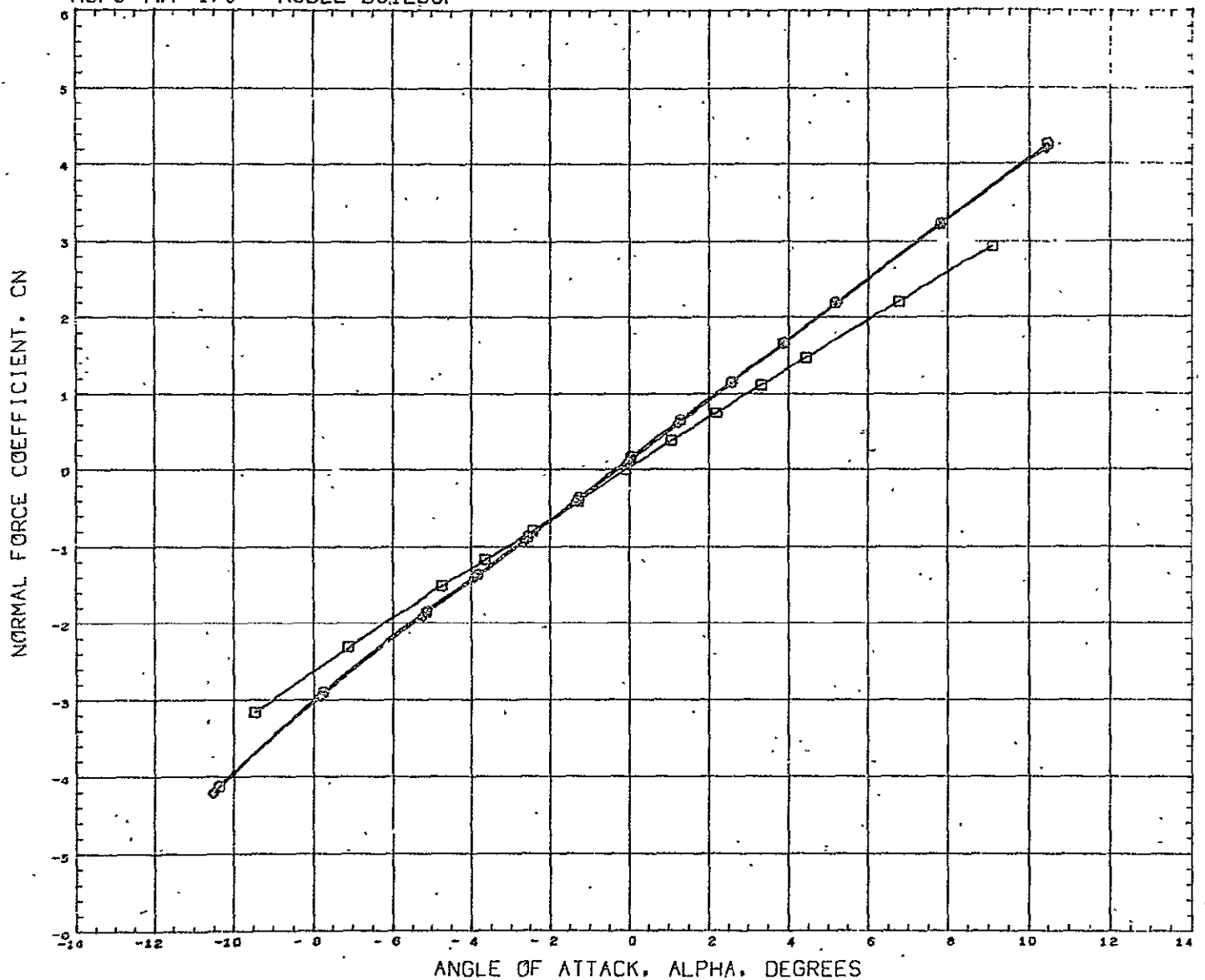
MSFC TWT 470 MODEL BUILDUP



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES			REFERENCE INFORMATION		
(B24081)	TWT470 S-1C/GAC ORBITER BF10WV5 BASIC	BETA	0.050	ORBINC	1.050	REFS	1.3960 SQ. IN.
(B24111)	TWT470 S-1C/GAC ORBITER BF10WV5 WING OFF	WNGINC	4.000	HTAIL	0.000	REFL	1.3330 INCHES
(B24131)	TWT470 S-1C/GAC ORBITER BF10WV5 STRONGBACK OFF	PHIB	0.000			REFB	1.3330 INCHES
						XMRP	5.2640 INCHES
						YMRP	0.0000 INCHES
						ZMRP	0.0000 INCHES
						SCALE	0.3366 PERCENT

HACH 1.195

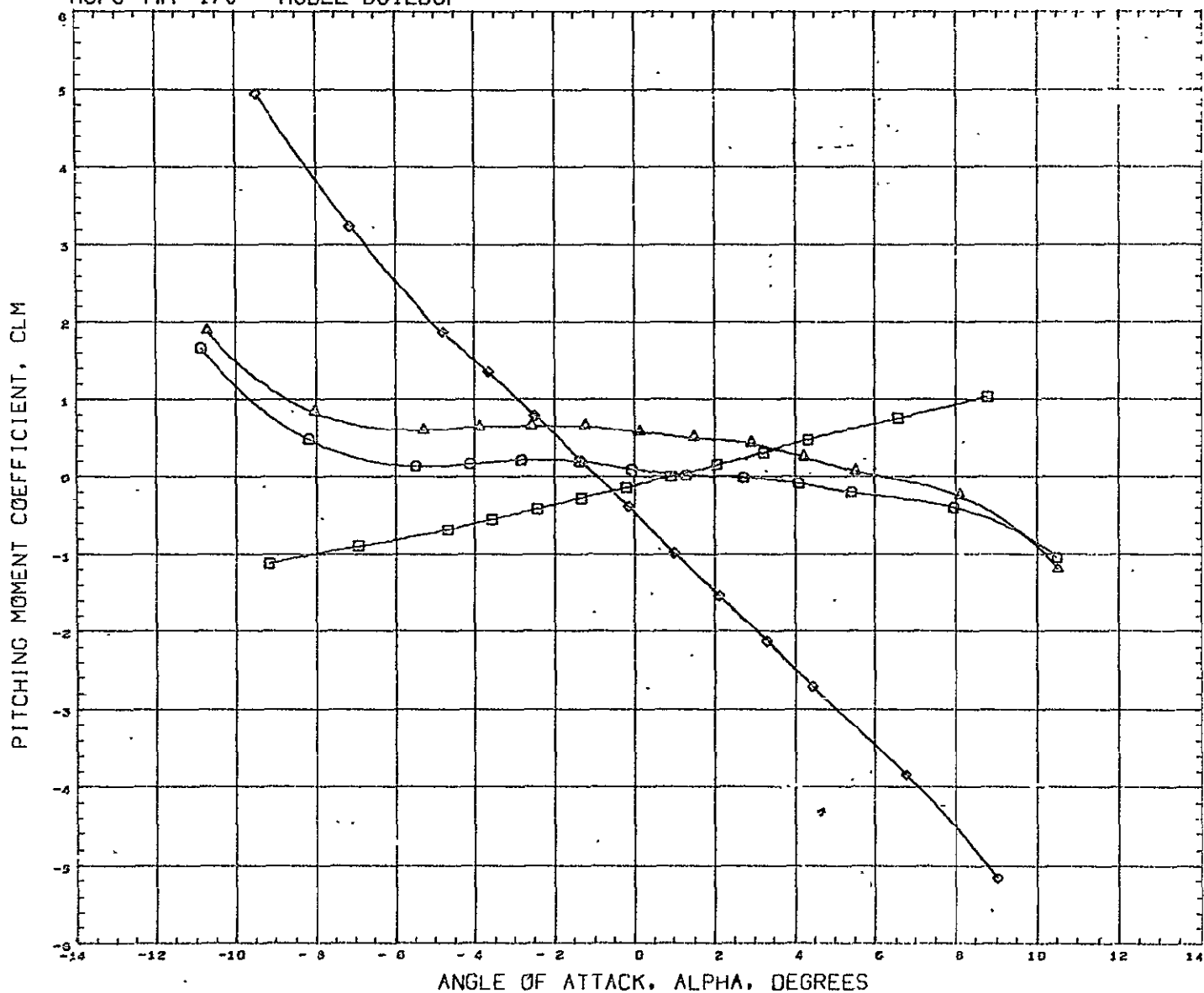
MSFC TWT 470 MODEL BUILDUP



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(B24081)	TWT470 S-1C/GAC ORBITER BF10WHYS BASIC	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ.IN.
(B24111)	TWT470 S-1C/GAC ORBITER BF10WHYS WING OFF	WHCINC 4.000 HTAIL 0.000	REFL 1.3330 INCHES
(B24151)	TWT470 S-1C/GAC ORBITER BF10WHY STRONGBACK OFF	FW1B 0.000	REFB 1.3330 INCHES
			XMRP 5.2640 INCHES
			YMRP 0.0000 INCHES
			ZMRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 1.456

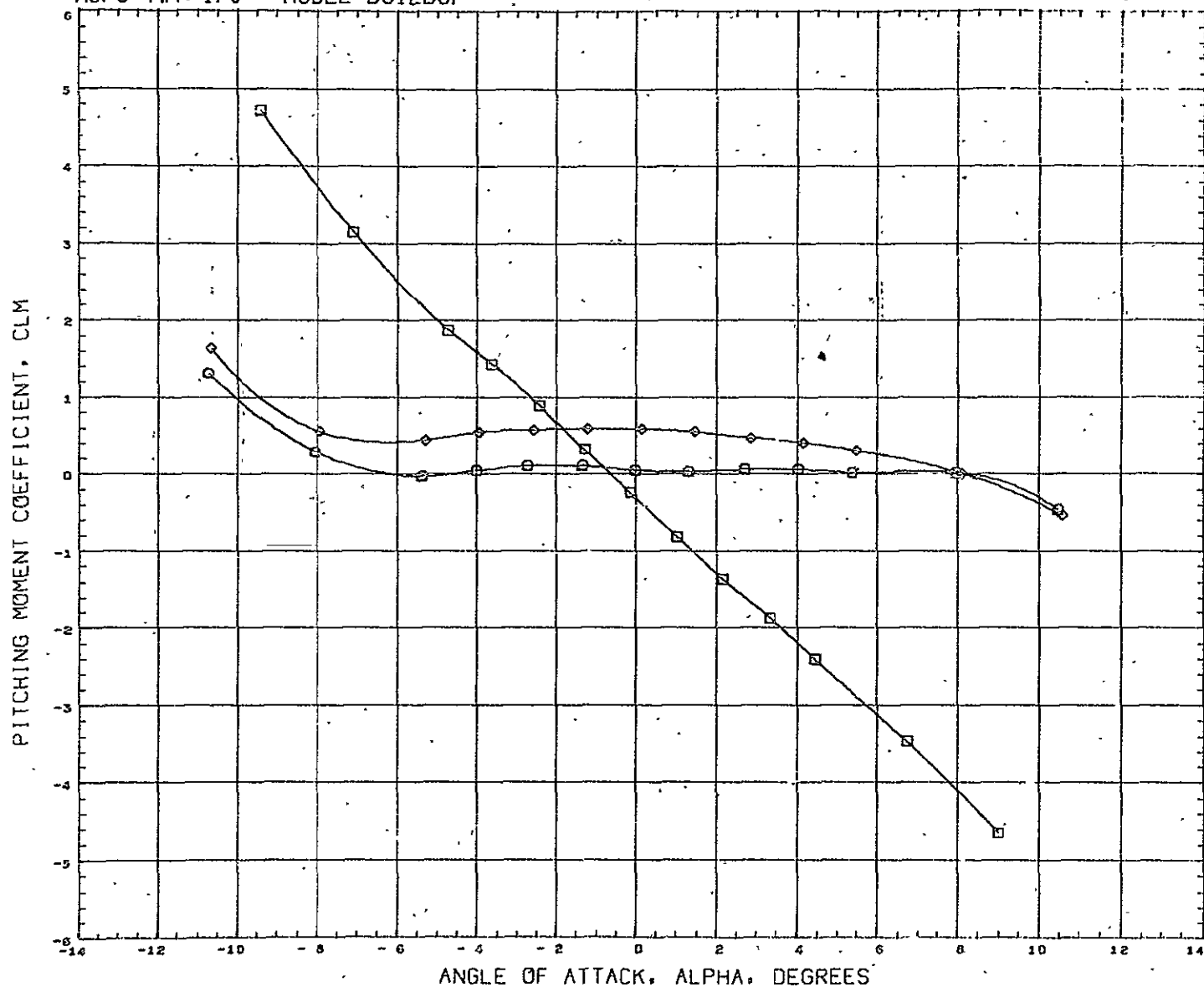
MSFC TWT 470 MODEL BUILDUP



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(X24081)	TWT470 S-IC/GAC ORBITER BF10WHVS	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ. IN.
(X24101)	TWT470 S-IC/GAC ORBITER BOHVS WING, FINS OFF	WINGINC 4.000 HTAIL 0.000	REFL 1.3330 INCHES
(X24111)	TWT470 S-IC/GAC ORBITER BF10WHVS WING OFF	PHIB 0.000	REFB 1.3330 INCHES
(X24161)	TWT470 S-IC/GAC ORBITER BF10WHVS		XHRP 5.2640 INCHES
			YHRP 0.0000 INCHES
			ZHRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 0.997

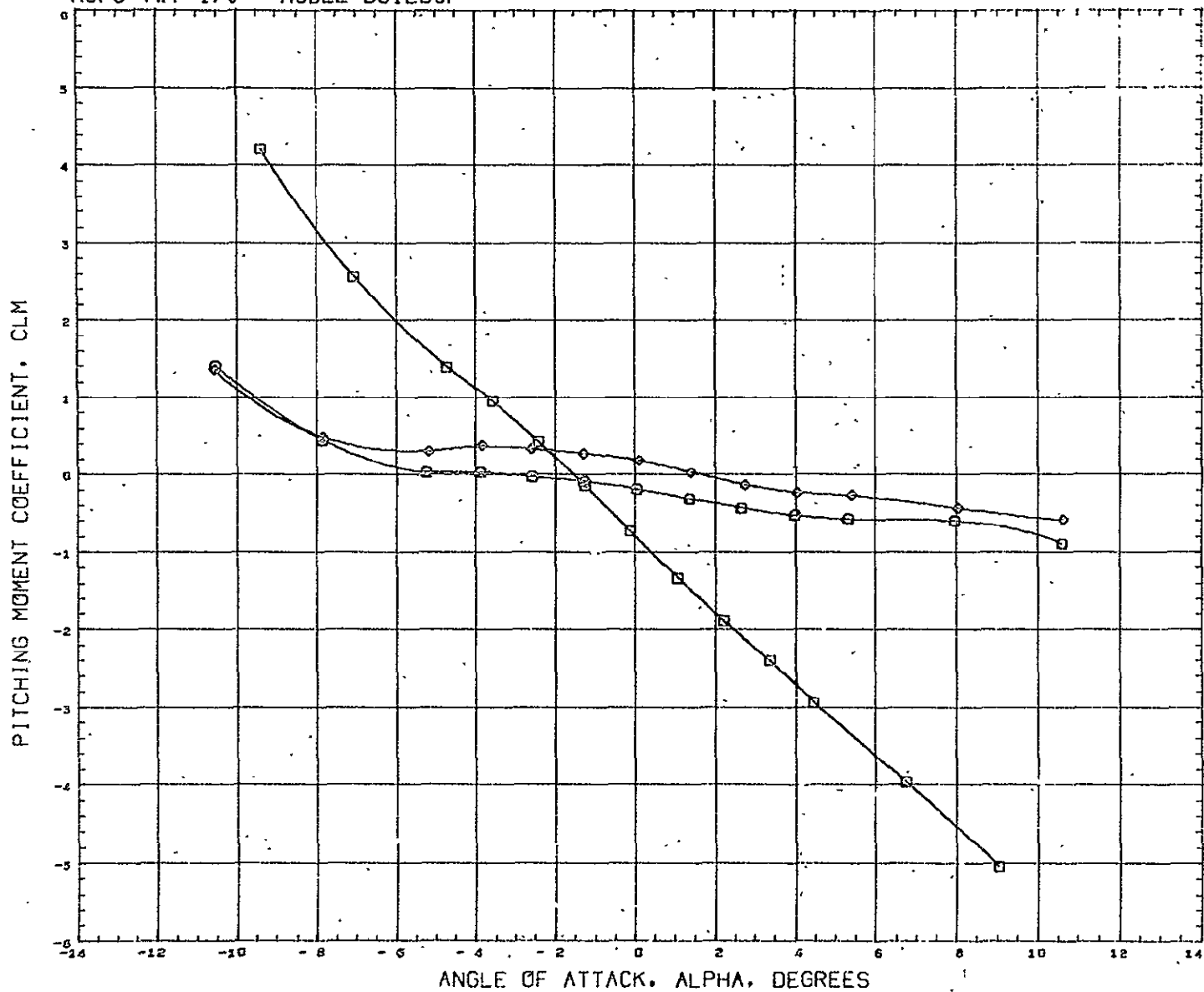
MSFC TWT. 470 MODEL BUILDUP



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES				REFERENCE INFORMATION	
(B24001)	TWT470 S-1C/GAC ORBITER BF10WHVS BASIC	BETA	- 0.050	ORBINC	- 1.050	REFS	1.3960 SQ.IN.
(B24111)	TWT470 S-1C/GAC ORBITER BF10HVS WING OFF	WNGINC	4.000	HTAIL	0.000	REFL	1.3330 INCHES
(B24151)	TWT470 S-1C/GAC ORBITER BF10WHV STRONGBACK OFF	PHIB	0.000			REFB	1.3330 INCHES
						XMRP	5.2640 INCHES
						YMRP	0.0000 INCHES
						ZMRP	0.0000 INCHES
						SCALE	0.3366 PERCNT

MACH 1.095

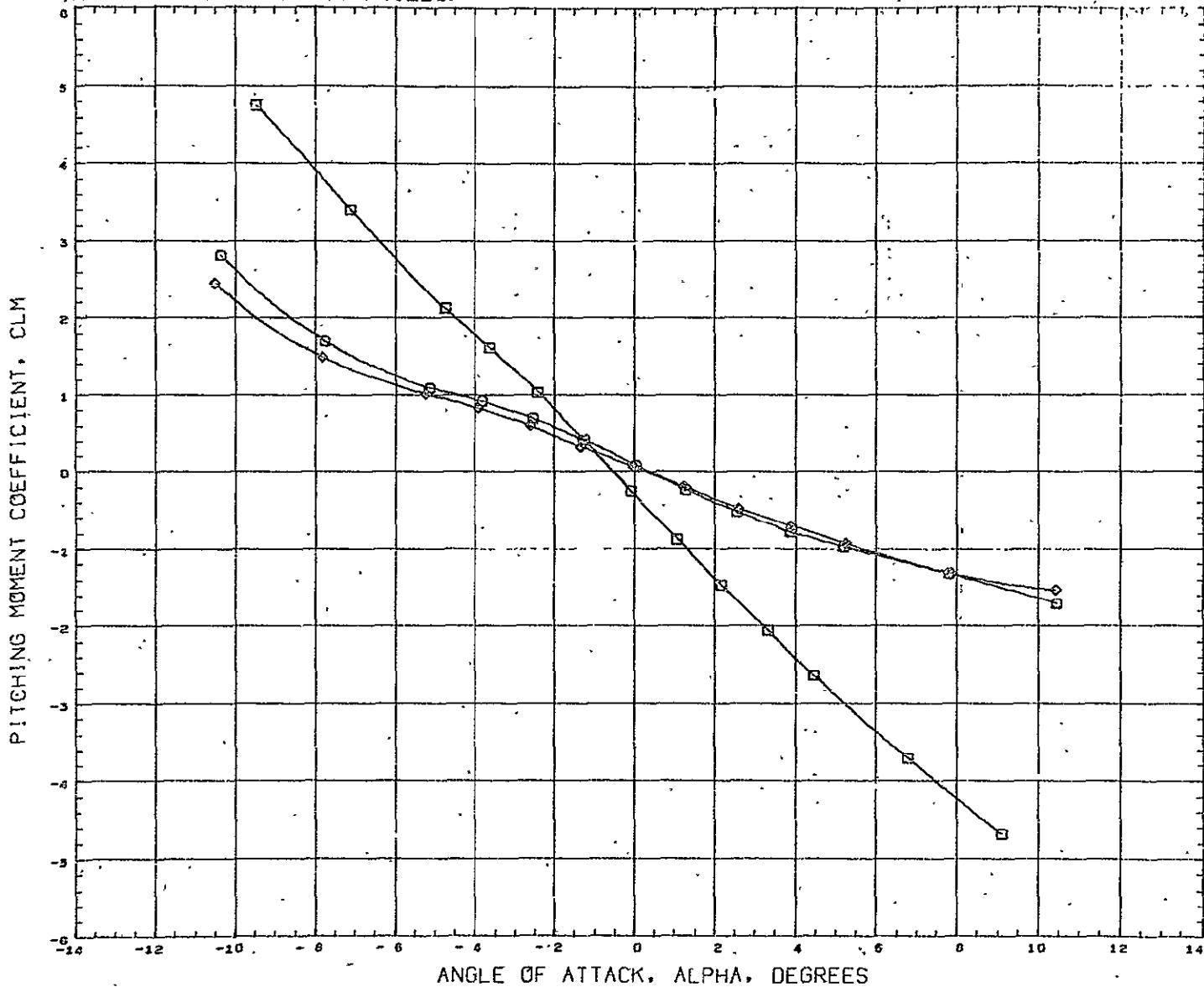
MSFC TWT 470 MODEL BUILDUP



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(B24081)	TWT470 S-IC/GAC ORBITER BF10WHVS BASIC	BETA 0.030 ORBINC - 1.030	REFS 1.3960 SQ. IN.
(B24111)	TWT470 S-IC/GAC ORBITER BF10WHVS WING OFF	WNGINC 4.000 MTAIL 0.000	REFL 1.3330 INCHES
(B24151)	TWT470 S-IC/GAC ORBITER BF10WHVS STRONGBACK OFF	PHIB 0.000	REFB 1.3330 INCHES
			XMRP 5.2640 INCHES
			YMRP 0.0000 INCHES
			ZMRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 1.195

MSFC TWT 470 MODEL BUILDUP



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(B24081) □ TWT470 S-1C/GAC ORBITER BF10WHVS BASIC
 (B24111) □ TWT470 S-1C/GAC ORBITER BF10HVS WING OFF
 (B24151) ◇ TWT470 S-1C/GAC ORBITER BF10WHV STRONGBACK OFF

PARAMETRIC VALUES

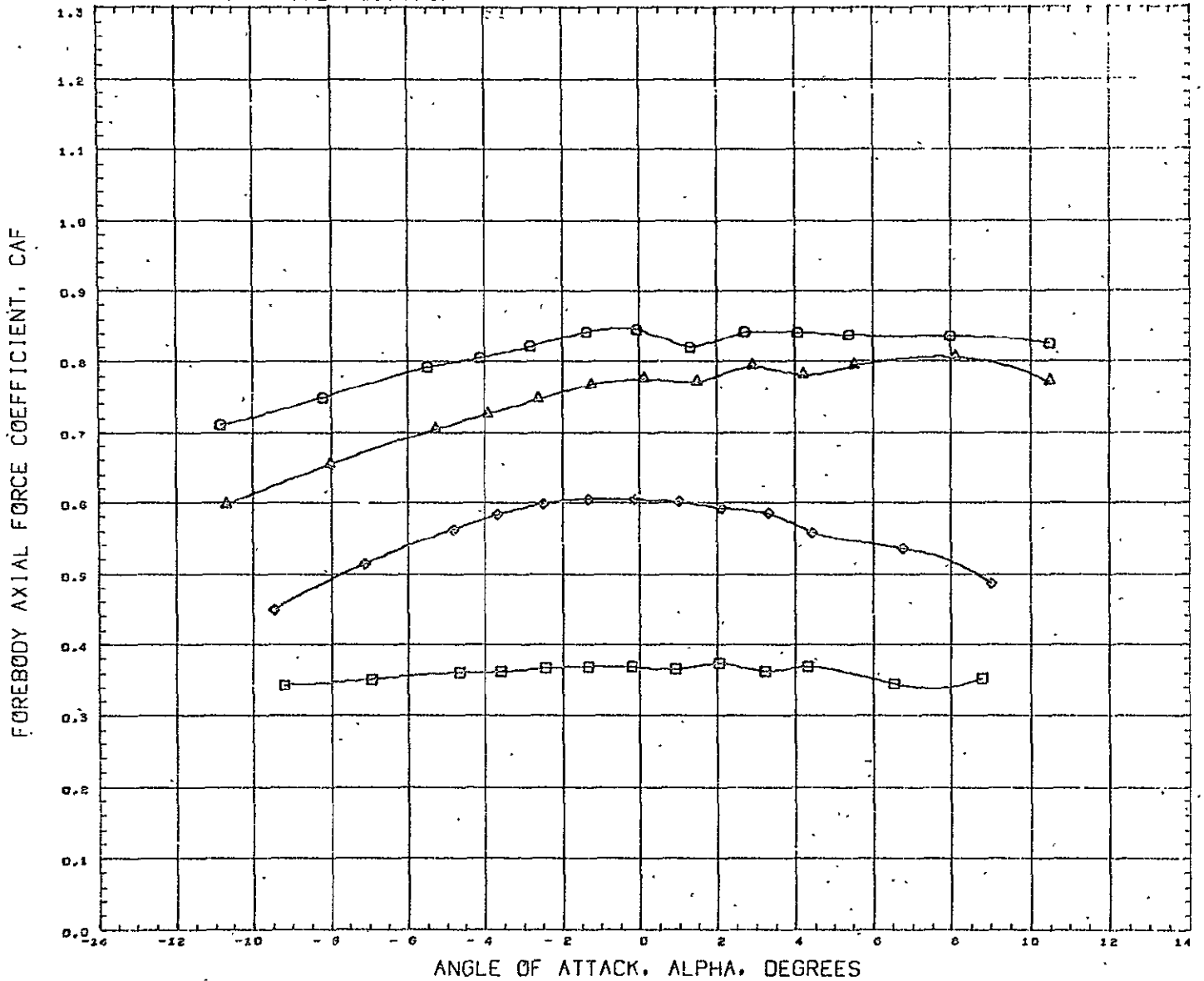
BETA - 0.050 ORBINC - 1.050
 WNGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION

REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRF 5.2640 INCHES
 YMRF 0.0000 INCHES
 ZMRF 0.0000 INCHES
 SCALE 0.3366 PERCENT

MACH 1.456

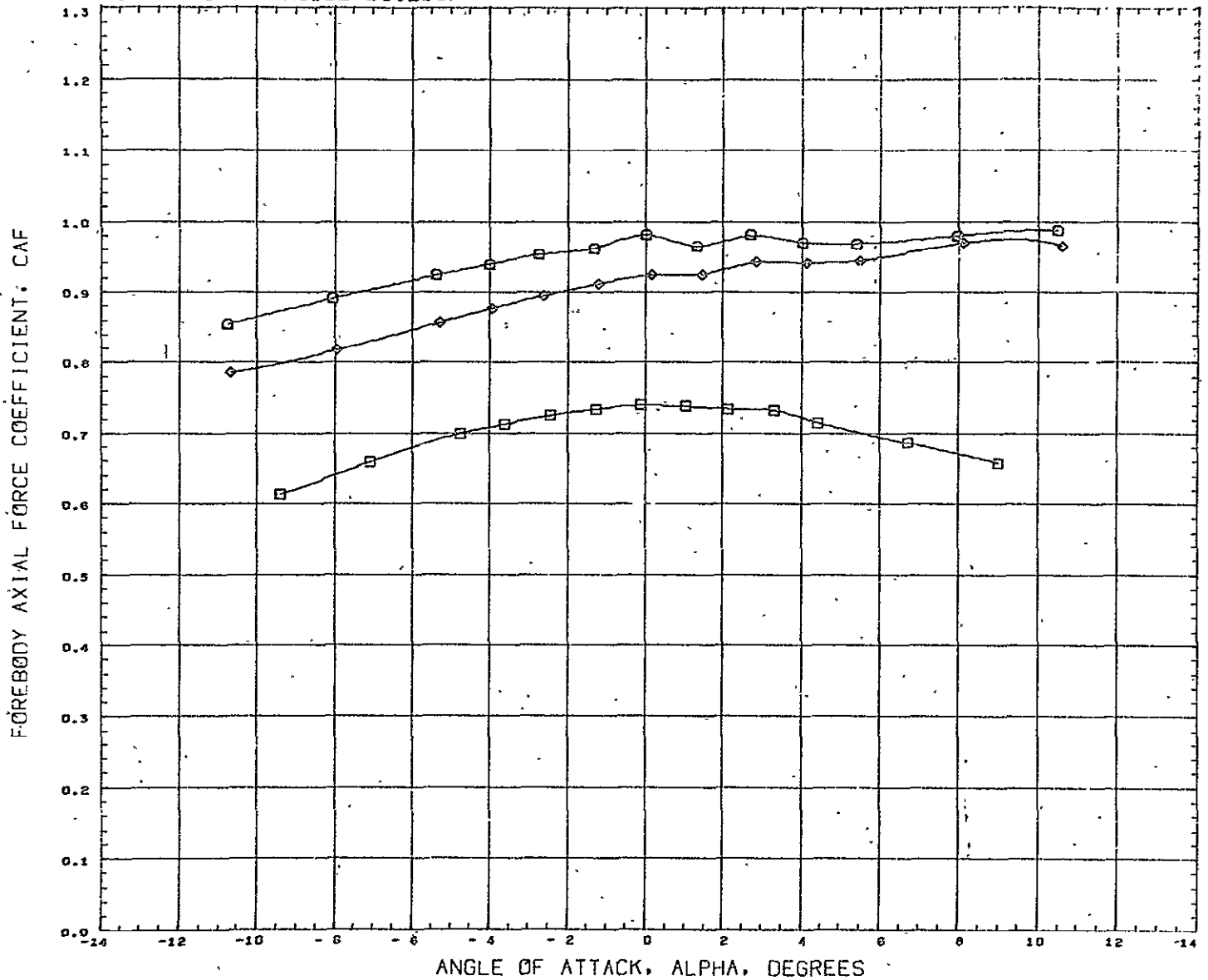
MSFC TWT 470 MODEL BUILDUP



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(X24081)	TWT470 S-1C/GAC ORBITER BF10HVS	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ. IN.
(X24101)	TWT470 S-1C/GAC ORBITER BOHVS WING, FINS OFF	WVGINC 4.000 HTAIL 0.000	REFL 1.3330 INCHES
(X24111)	TWT470 S-1C/GAC ORBITER BF10HVS WING OFF	PHIB 0.000	REFB 1.3330 INCHES
(X24151)	TWT470 S-1C/GAC ORBITER BF10HVS		XMRP 5.2640 INCHES
			YMRP 0.0000 INCHES
			ZMRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

NACH 0.997

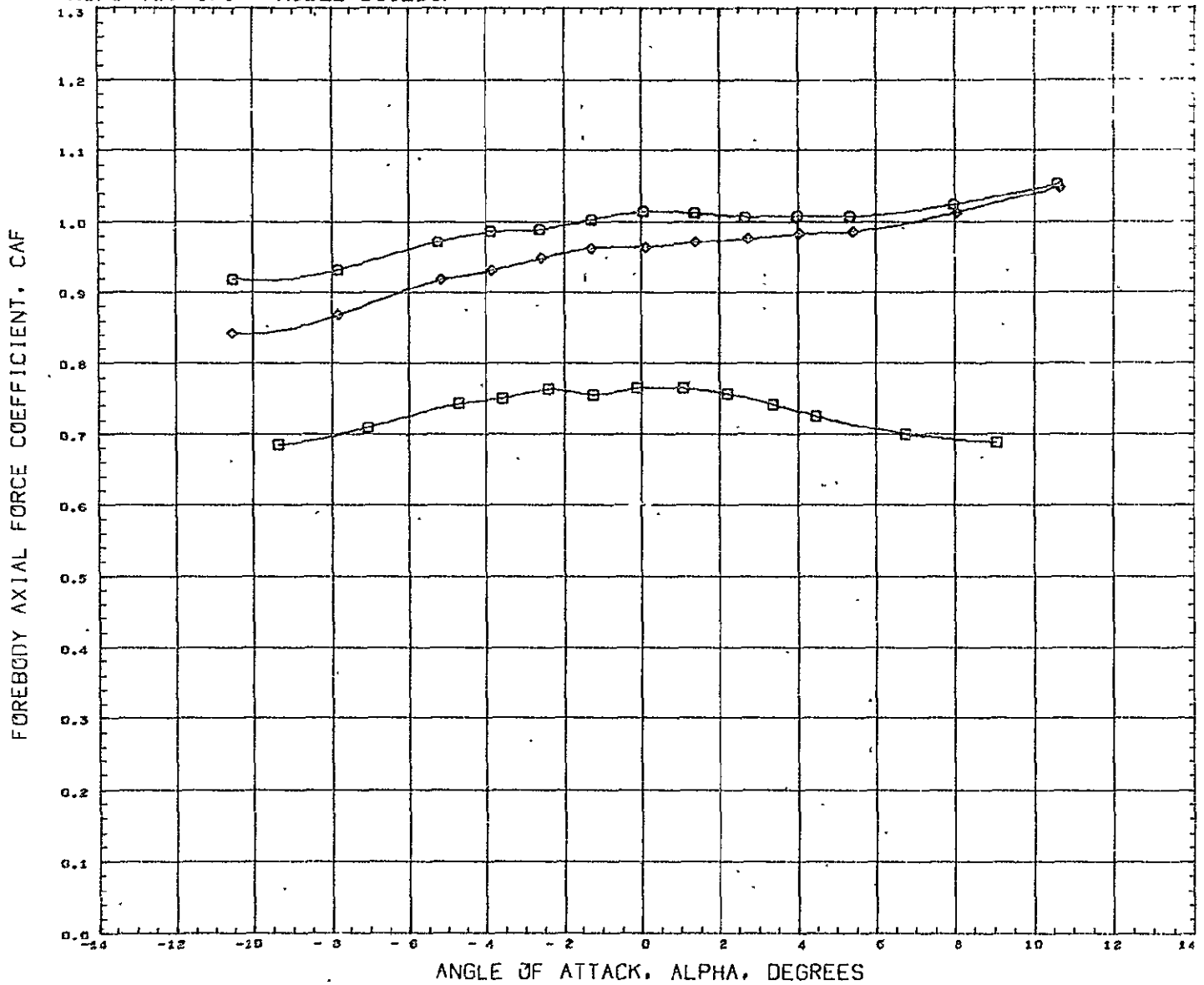
MSFC TWT 470 MODEL BUILDUP



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES				REFERENCE INFORMATION	
(B24081)	TWT470 S-IC/GAC ORBITER BF10WHVS BASIC	BETA	- 0.050	ORBINC	- 1.050	REFS	1.3960 SQ. IN.
(B24111)	TWT470 S-IC/GAC ORBITER BF10WHVS WING OFF	WNGINC	4.000	HTAIL	0.000	REFL	1.3330 INCHES
(B24151)	TWT470 S-IC/GAC ORBITER BF10WHV STRONGBACK OFF	PHIB	0.000			REFB	1.3330 INCHES
						XMRP	5.2640 INCHES
						YMRP	0.0000 INCHES
						ZMRP	0.0000 INCHES
						SCALE	0.3366 PERCENT

MACH 1.095

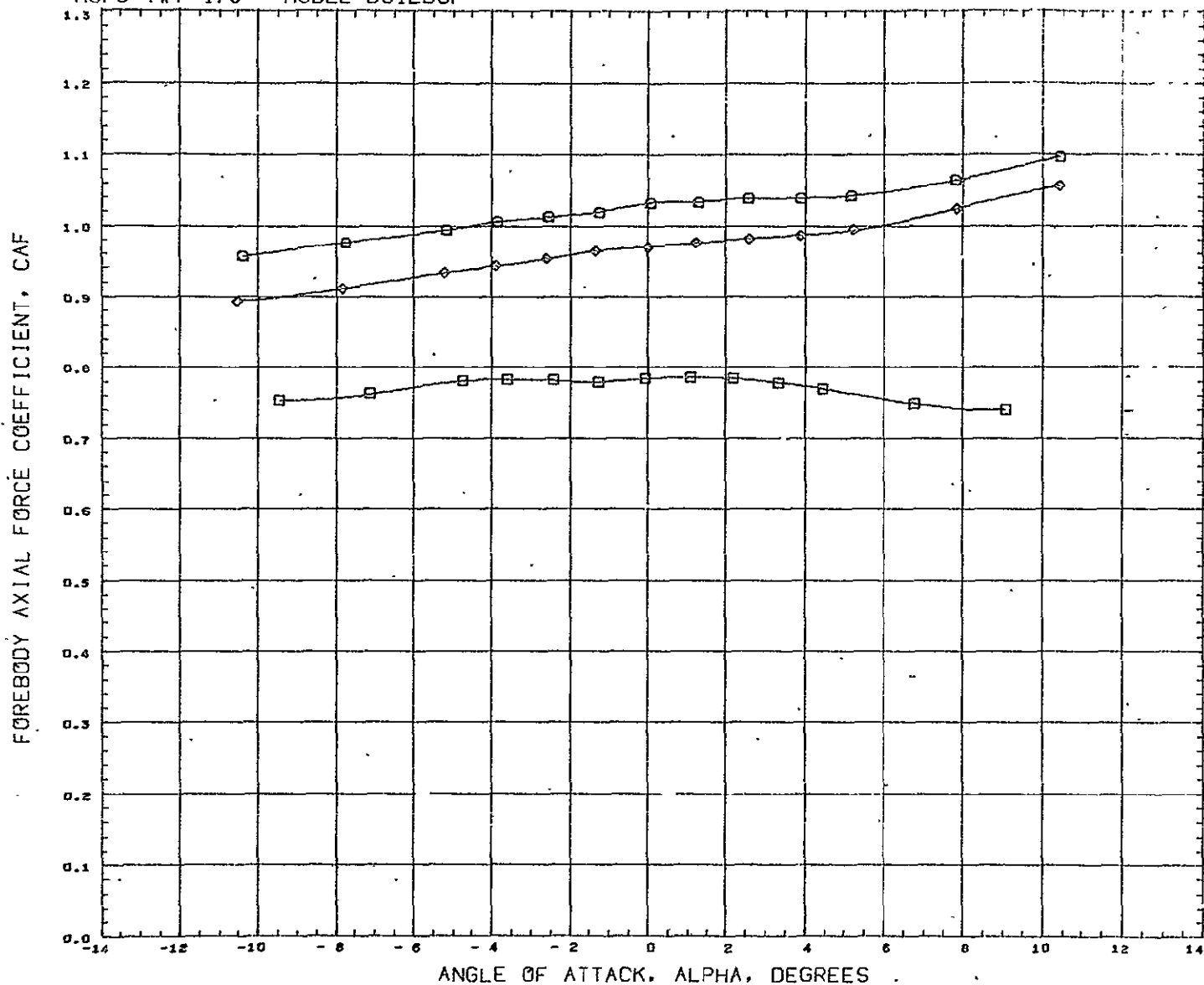
MSFC TWT 470 MODEL BUILDUP



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(B24081)	TWT470 S-IC/GAC ORBITER BF10WHVS BASIC	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ. IN.
(B24111)	TWT470 S-IC/GAC ORBITER BF10WHVS WING OFF	WNGINC 4.000 HTAIL 0.000	REFL 1.3330 INCHES
(B24131)	TWT470 S-IC/GAC ORBITER BF10WHVS STRONGBACK OFF	PHIB 0.000	REFB 1.3330 INCHES
			XHRP 5.2640 INCHES
			YHRP 0.0000 INCHES
			ZHRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 1.195

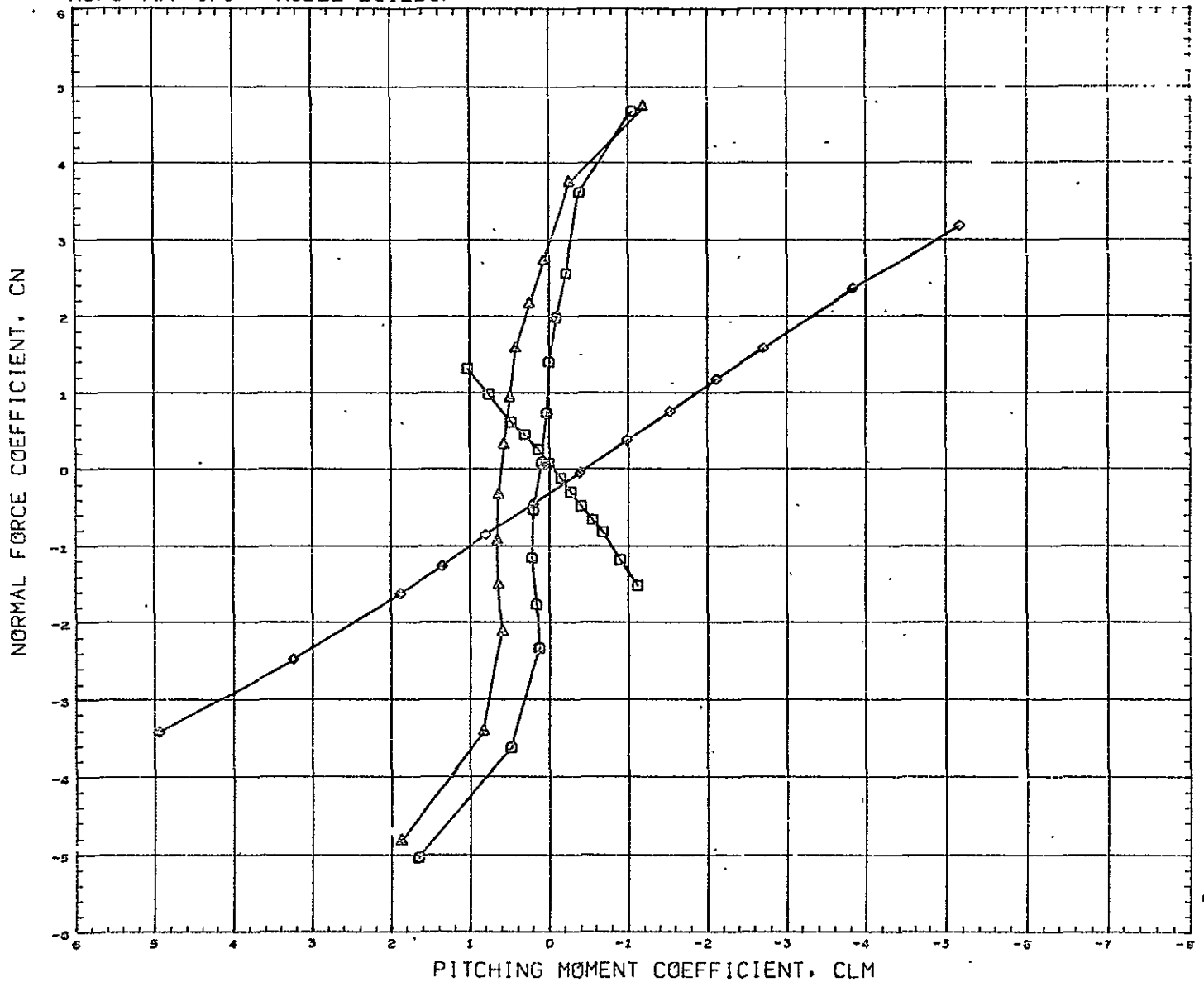
MSFC TWT 470 MODEL BUILDUP



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(B24061)	TWT470 S-IC/GAC ORBITER BF10WHVS BASIC	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ. IN.
(B24111)	TWT470 S-IC/GAC ORBITER BF10HVS WING OFF	WINGINC 4.000 HTAIL 0.000	REFL 1.3330 INCHES
(B24151)	TWT470 S-IC/GAC ORBITER BF10HVS STRONGBACK OFF	PNIB 0.000	REFB 1.3330 INCHES
			XMRP 5.2640 INCHES
			YMRP 0.0000 INCHES
			ZMRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 1.456

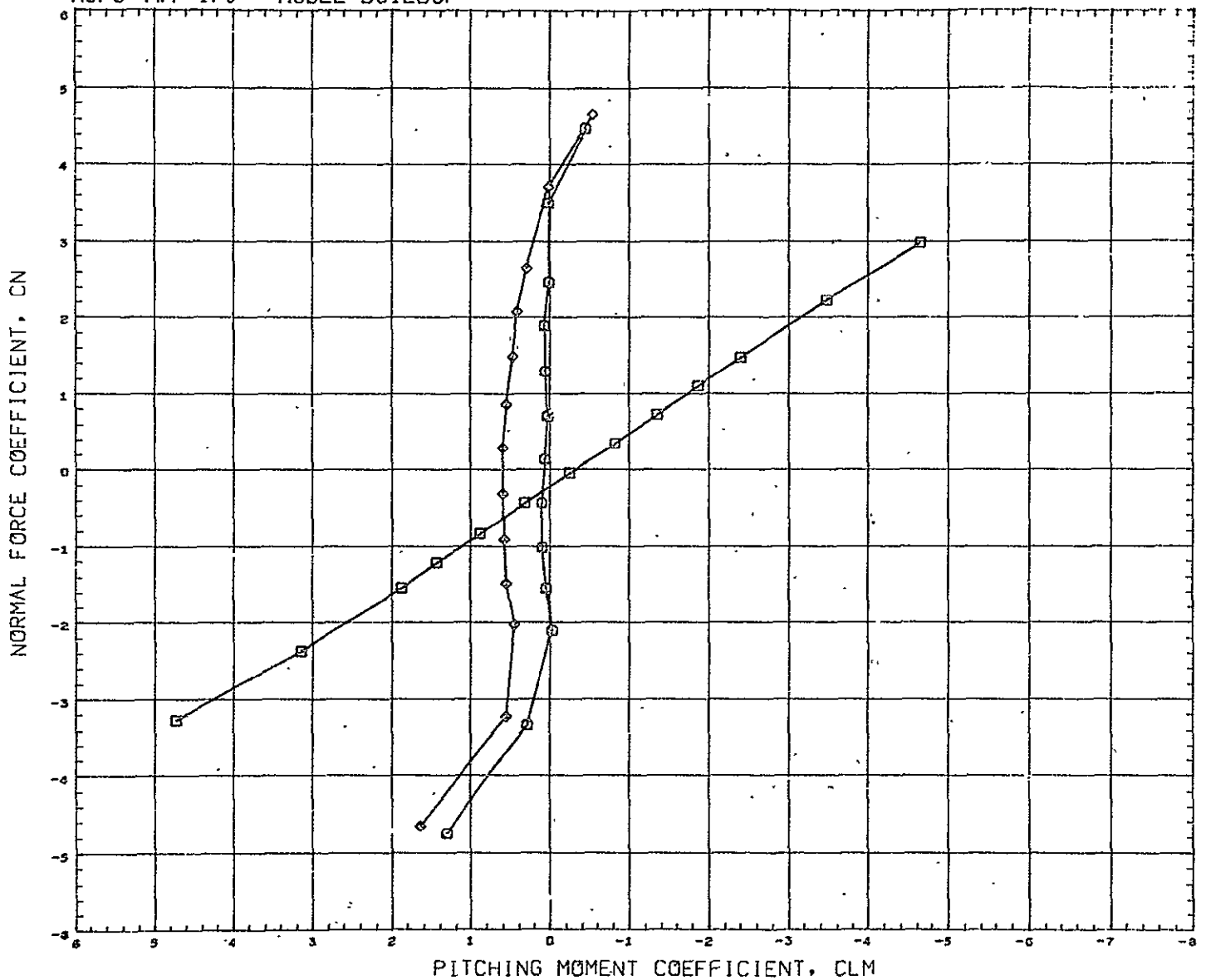
MSFC TWT 470 MODEL BUILDUP



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(X24081)	TWT470 S-1C/GAC ORBITER 7P10HMY5	BETA = 0.050 ORBINC = 1.050	REFS 1.3960 SQ. IN.
(A24101)	TWT470 S-1C/GAC ORBITER BOHVS WING, FINS OFF	WNGINC 4.000 MTAIL 0.000	REFL 1.3330 INCHES
(X24111)	TWT470 S-1C/GAC ORBITER BF10HMY5 WING OFF	FHIB 0.000	REFB 1.3330 INCHES
(X24151)	TWT470 S-1C/GAC ORBITER BF10HMY		XMRP 5.2640 INCHES
			YMRP 0.0000 INCHES
			ZMRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 0.997

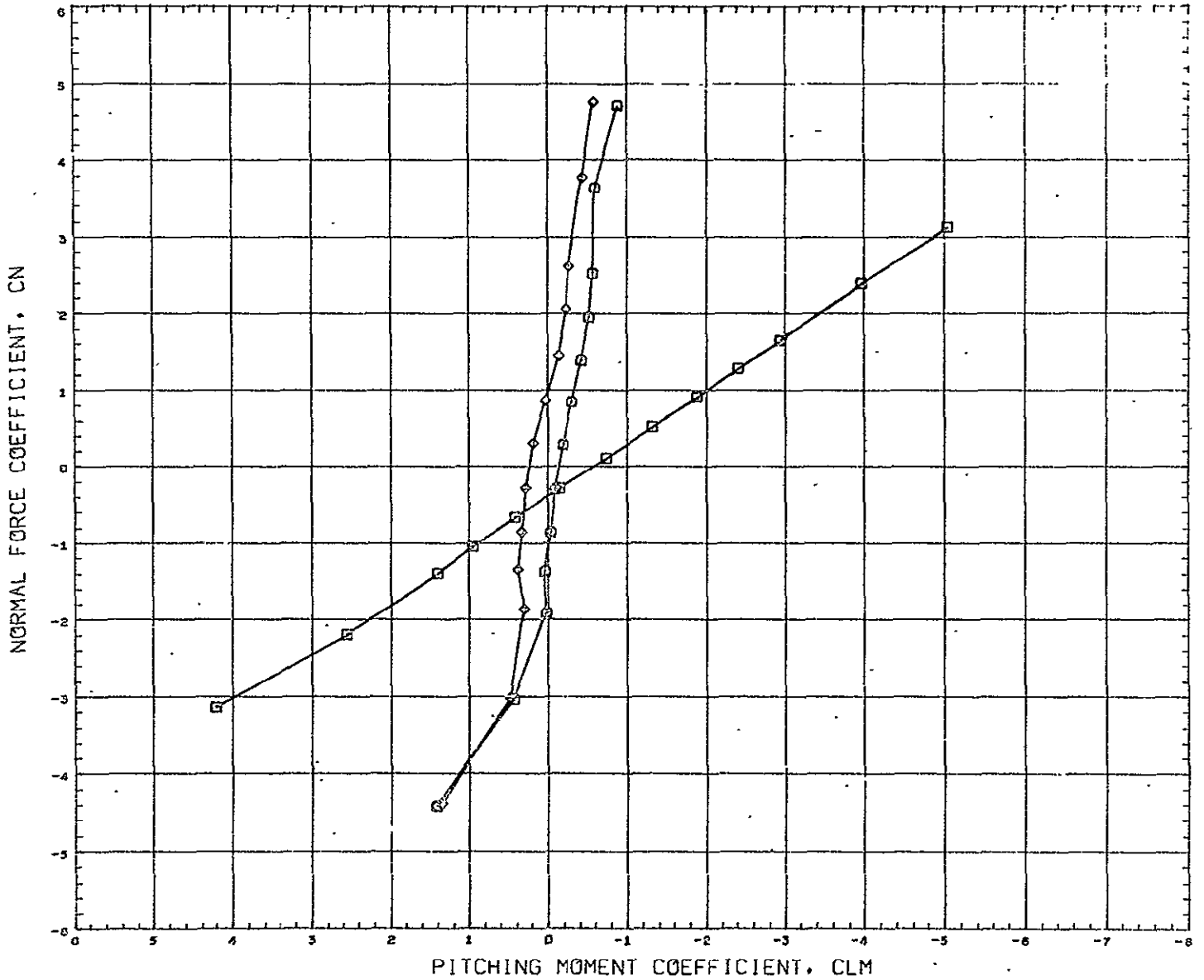
MSFC TWT 470 MODEL BUILDUP



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(B24081)	TWT470 S-1C/CAC ORBITER BF10WHVS BASIC	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ. IN.
(B24111)	TWT470 S-1C/CAC ORBITER BF10HVS WING OFF	WNGINC 4.000 HTAIL 0.000	REFL 1.3330 INCHES
(B24151)	TWT470 S-1C/CAC ORBITER BF10WHV STRONGBACK OFF	FXIB 0.000	REFB 1.3330 INCHES
			XMRP 5.2640 INCHES
			YMRP 0.0000 INCHES
			ZMRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 1.095

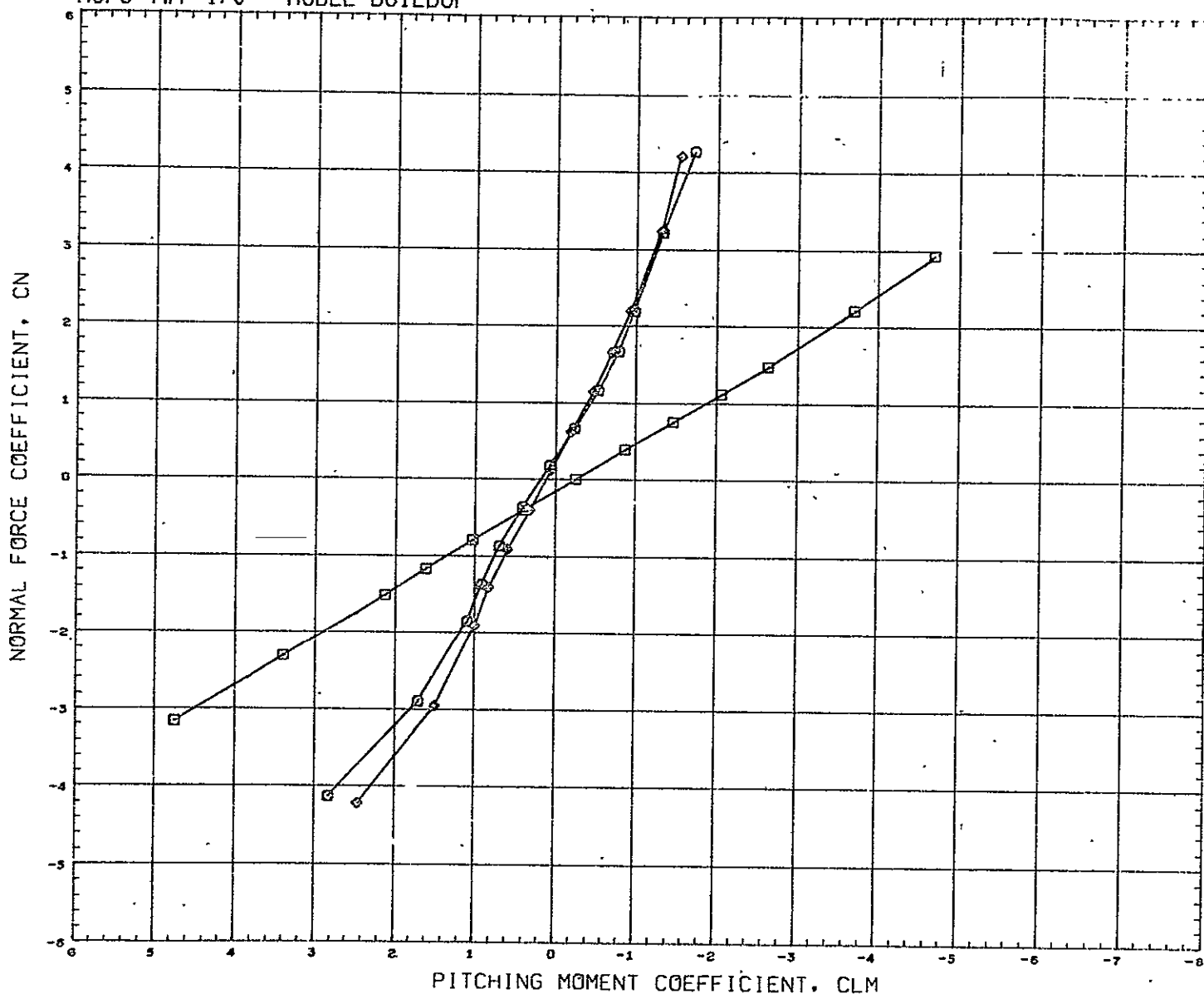
MSFC TWT 470 MODEL BUILDUP



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES				REFERENCE INFORMATION		
(B24081)	TWT470 S-IC/GAC ORBITER BF10WHVS BASIC	BETA	- 0.050	ORGINC	- 1.050	REFS	1.3960	SQ. IN.
(B24111)	TWT470 S-IC/GAC ORBITER BF10WHVS WING OFF	WINGINC	4.000	HTAIL	0.000	REFL	1.3330	INCHES
(B24151)	TWT470 S-IC/GAC ORBITER BF10WHVS STRONGBACK OFF	PHIB	0.000			REFB	1.3330	INCHES
						XMRP	5.2640	INCHES
						YMRP	0.0000	INCHES
						ZMRP	0.0000	INCHES
						SCALE	0.3366	PERCENT

MACH 1.195

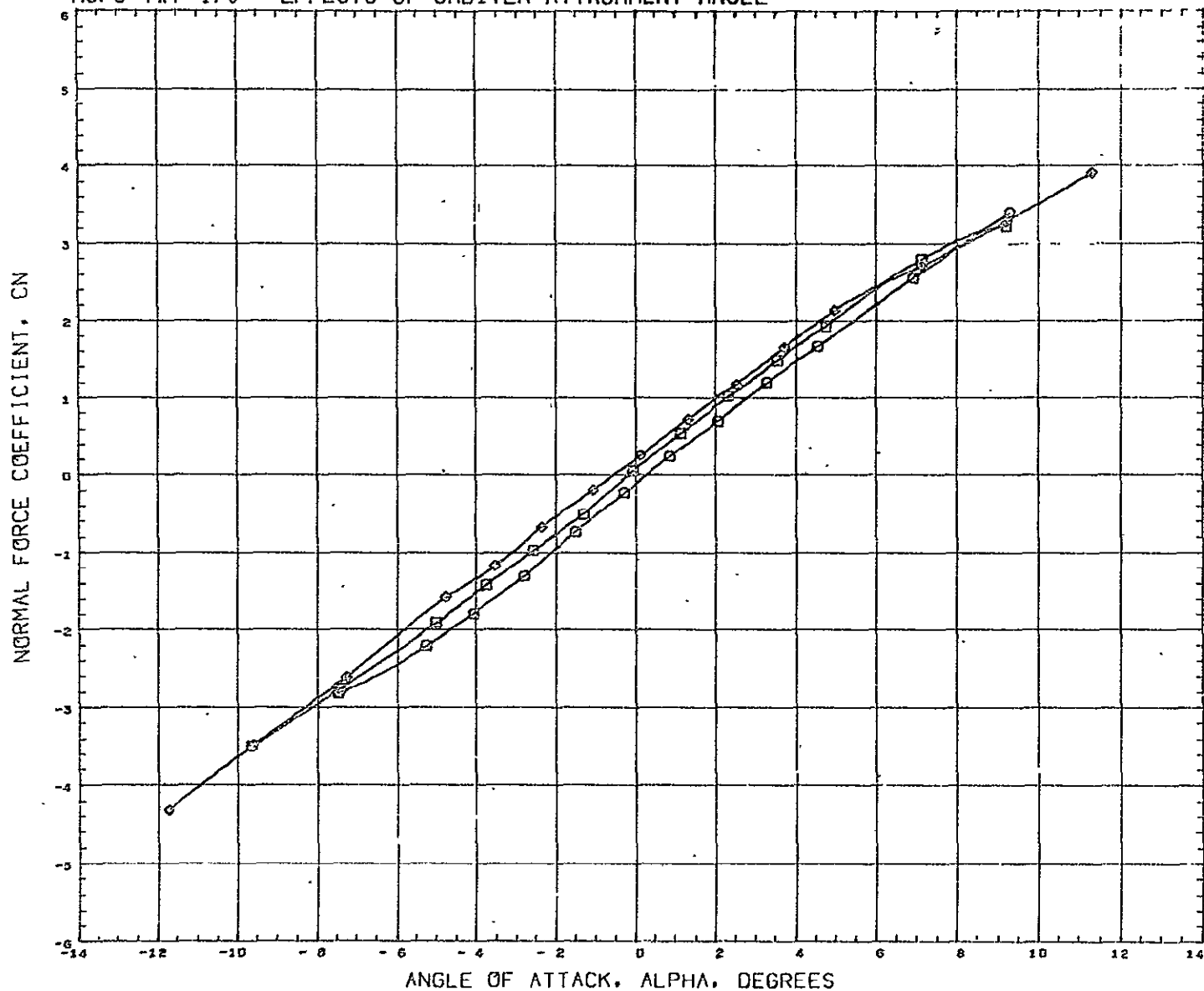
MSFC TWT 470 MODEL BUILDUP



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(B24091)	TWT470 S-IC/GAC ORBITER BF10WHVS BASIC	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ. IN.
(B24111)	TWT470 S-IC/GAC ORBITER BF10WHVS WING OFF	WNGINC 4.000 HTAIL 0.000	REFL 1.3330 INCHES
(B24151)	TWT470 S-IC/GAC ORBITER BF10WHV STRONGBACK OFF	PHIB 0.000	REFB 1.3330 INCHES
			XMRP 5.2640 INCHES
			YMRP 0.0000 INCHES
			ZMRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 1.456

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE



SYMBOL	ORBITING	PARAMETRIC VALUES
○	4.000	MACH 0.597 BETA - 0.050
□	2.000	WINGINC 4.000 HTAIL 0.000
◇	0.000	FHIB 0.000

REFERENCE INFORMATION		
REFS	1.3960	50. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

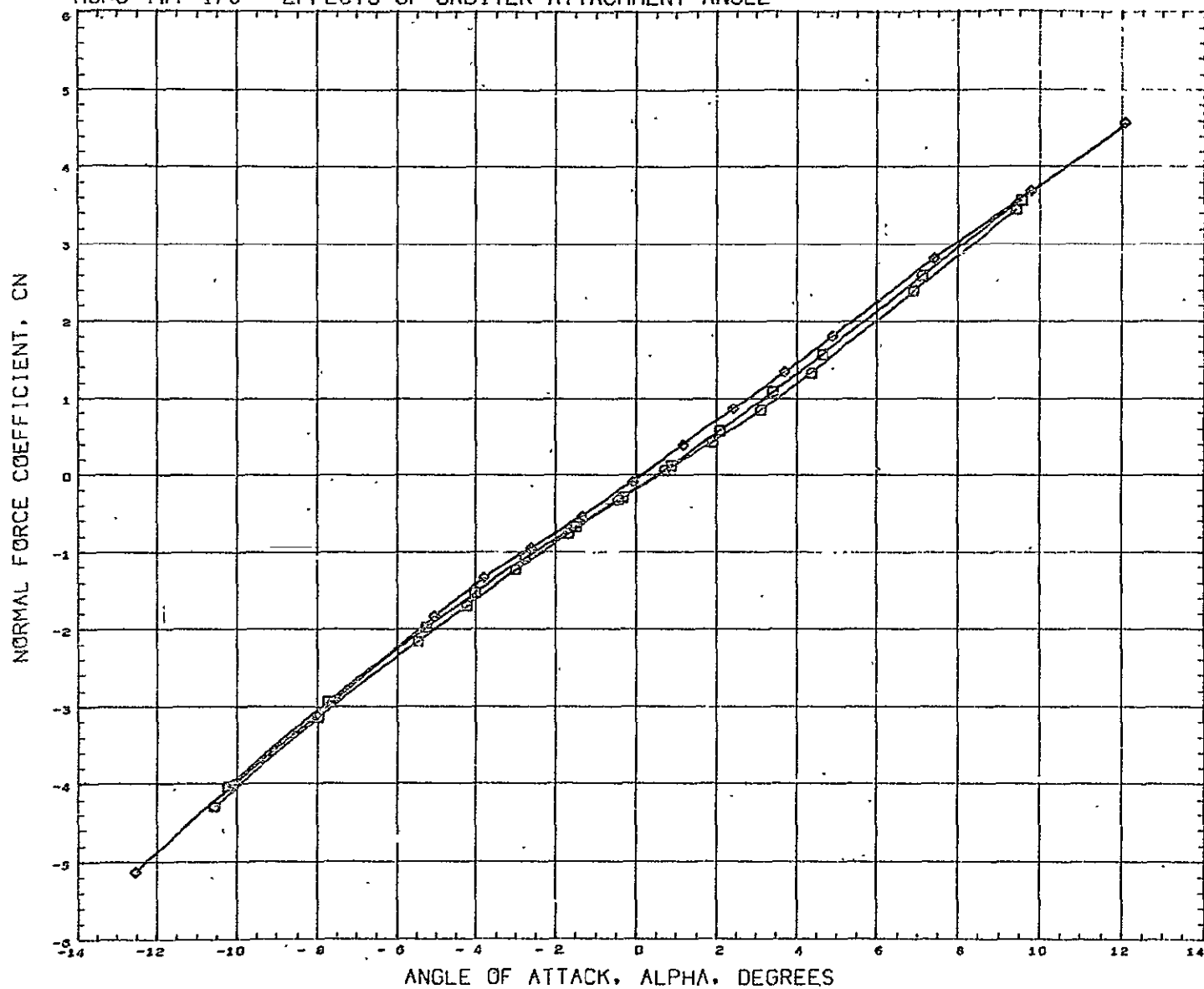
REFERENCE FILE

TWT470 S-IC/GAC ORBITER BF10WHVS FINS ON

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MSEC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE



SYMBOL	ORBITER	PARAMETRIC VALUES			
\square	4.000	MACH	0.901	BETA	-0.050
\diamond	2.000	WINGINC	4.000	HTAIL	0.000
\circ	0.000	PHIB	0.000		

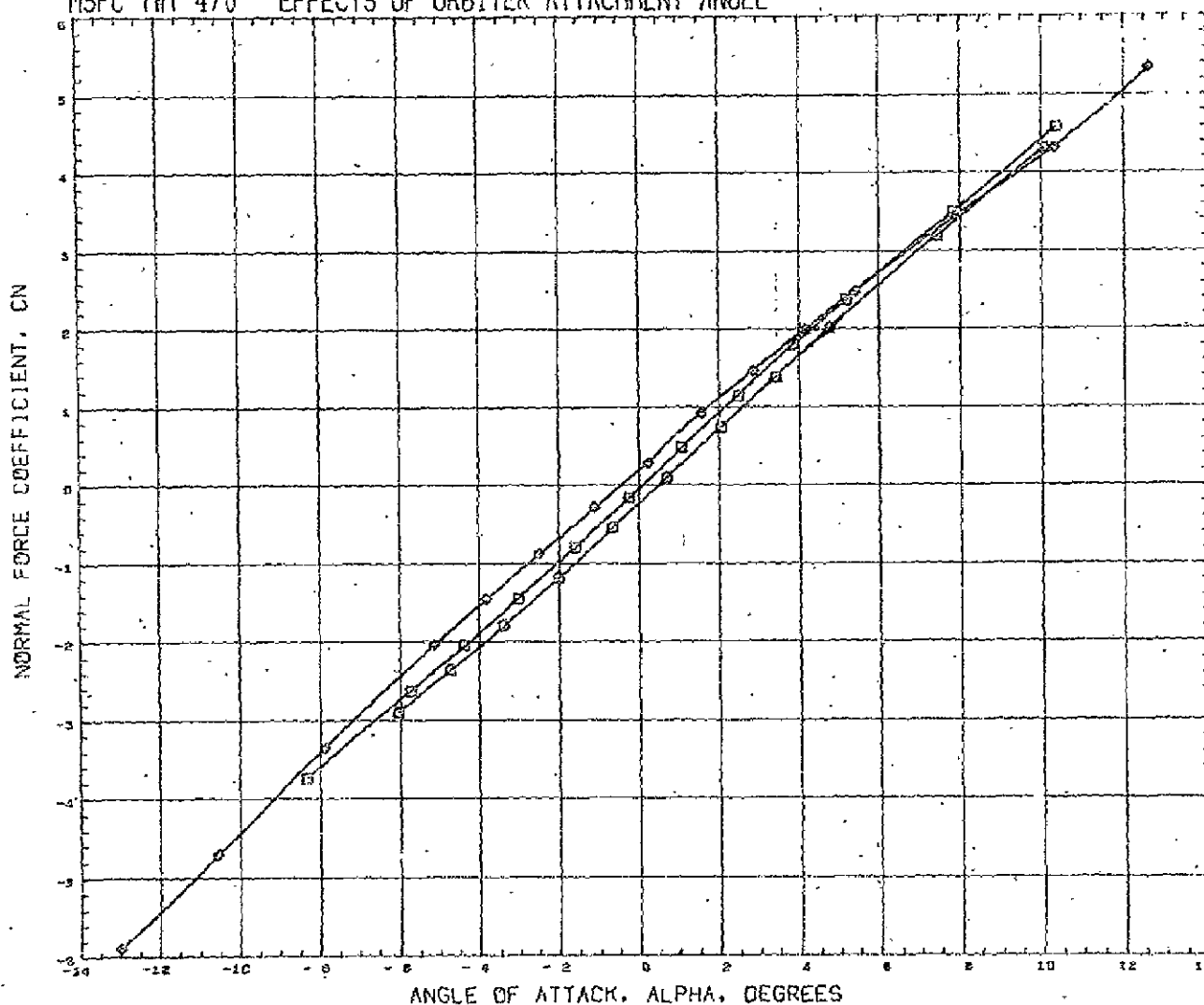
REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRF	5.2640	INCHES
YHRF	0.0000	INCHES
ZHRF	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

TWT470 S-IC/GAC ORBITER BF10WHVS FINS ON

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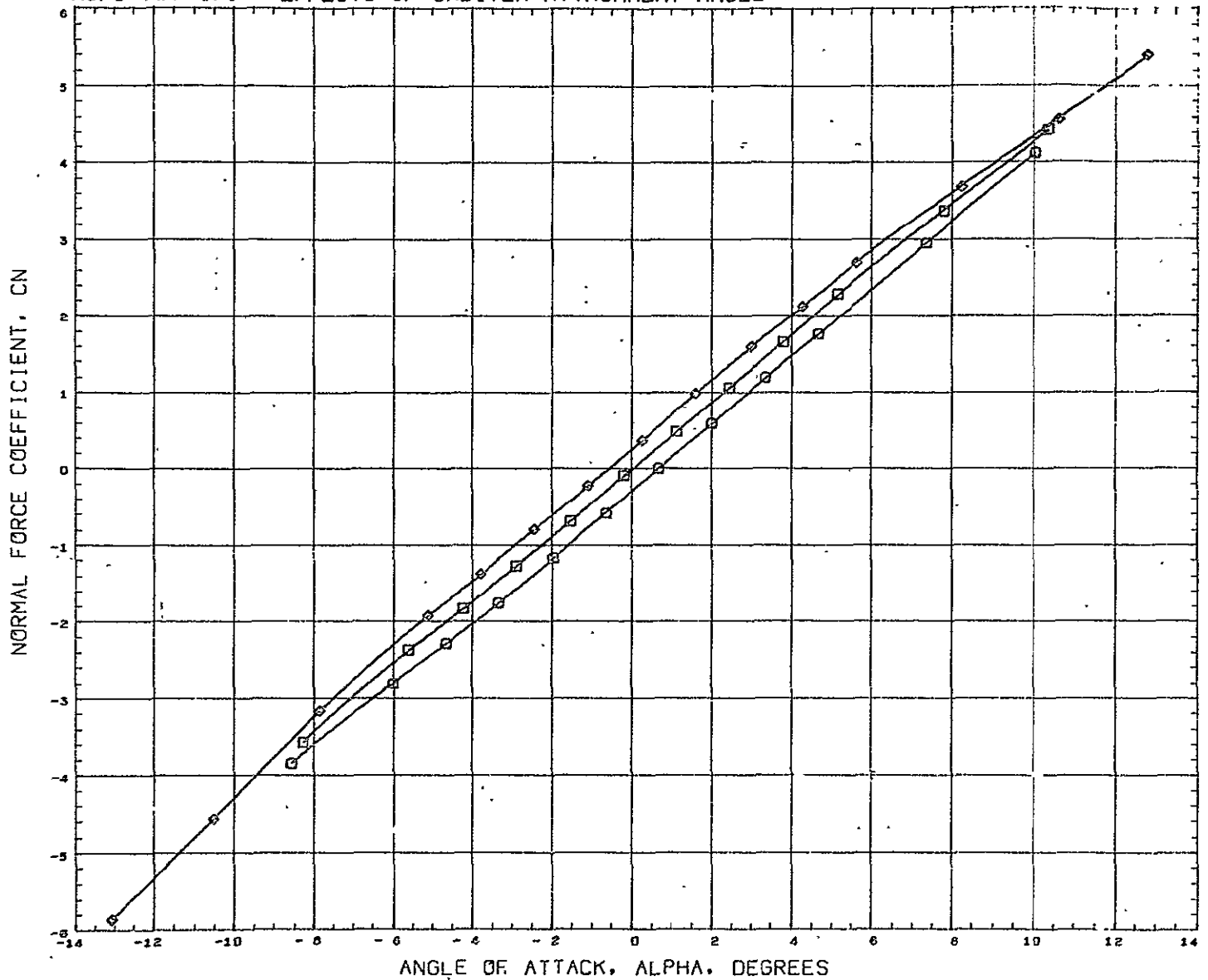
MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE



SYMBOL		ORBITER		PARAMETRIC VALUES				REFERENCE INFORMATION		
□	4.000	MACH	1.000	BETA	0.050	REFS	1.3960	SQ. IN.		
◇	2.000	WING INC	4.000	NTAIL	0.000	REFL	1.3330	INCHES		
○	0.000	FNIS	0.000			REFB	1.3330	INCHES		
						XMRF	5.2640	INCHES		
						YMRF	0.0000	INCHES		
						ZMRF	0.0000	INCHES		
						SCALE	0.3386	PERCENT		

REFERENCE FILE

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

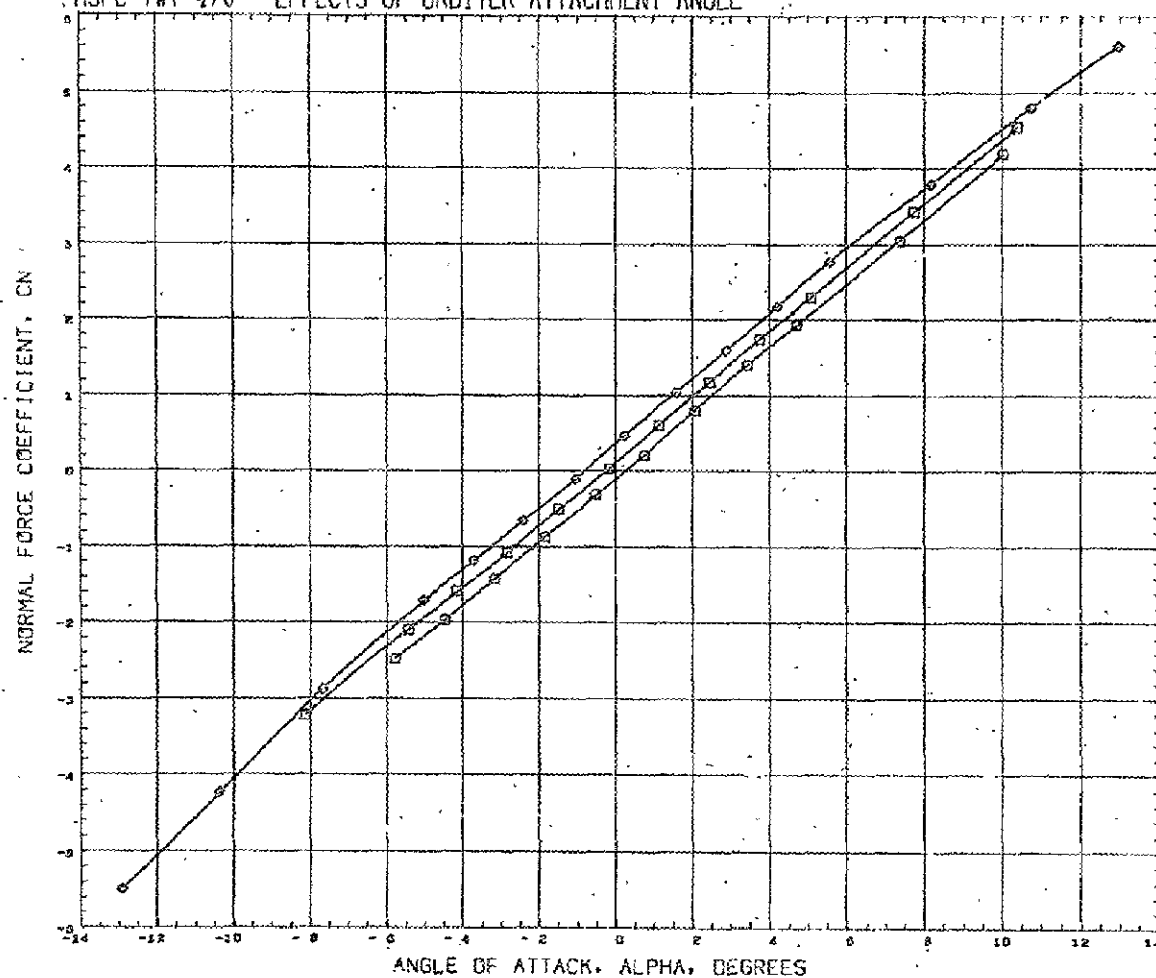


SYMBOL	ORBITER	PARAMETRIC VALUES			
□	4.000	MACH	1.098	BETA	- 0.050
□	2.000	WINGINC	4.000	HTAIL	0.000
◇	0.000	PHIB	0.000		

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRF	5.2640	INCHES
YNRF	0.0000	INCHES
ZNRF	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE



SYMBOL		ORBITER		PARAMETRIC VALUES		REFERENCE INFORMATION	
□	-	4.000	MACH	1.193	BETA	-	0.000
◇	-	2.000	MACH	4.000	BETA	-	0.000
○	-	0.000	MACH	0.000	BETA	-	0.000

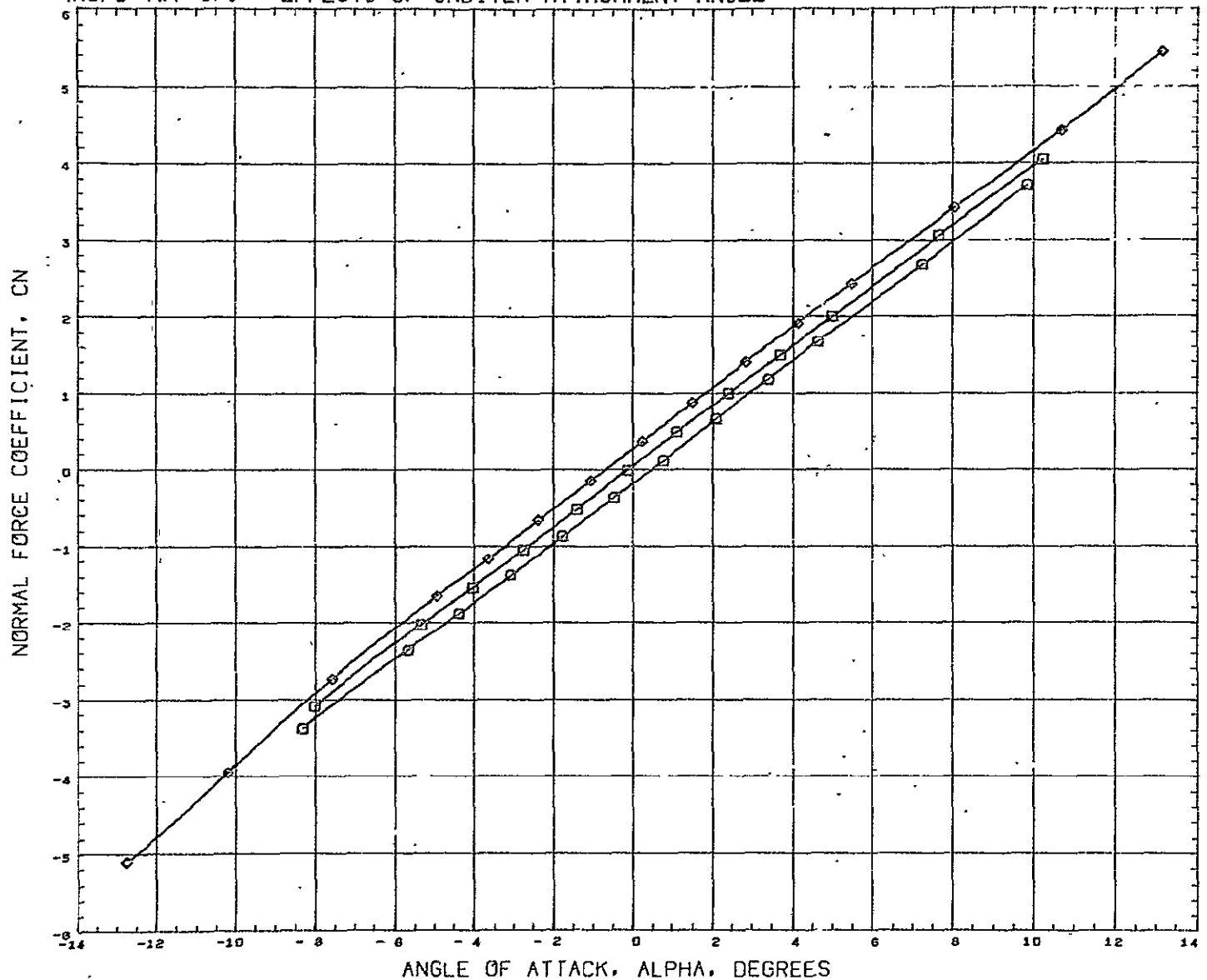
REFERENCE FILE

TWT470 S-1C/GAC ORBITER BF10WHVS FINS ON

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MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

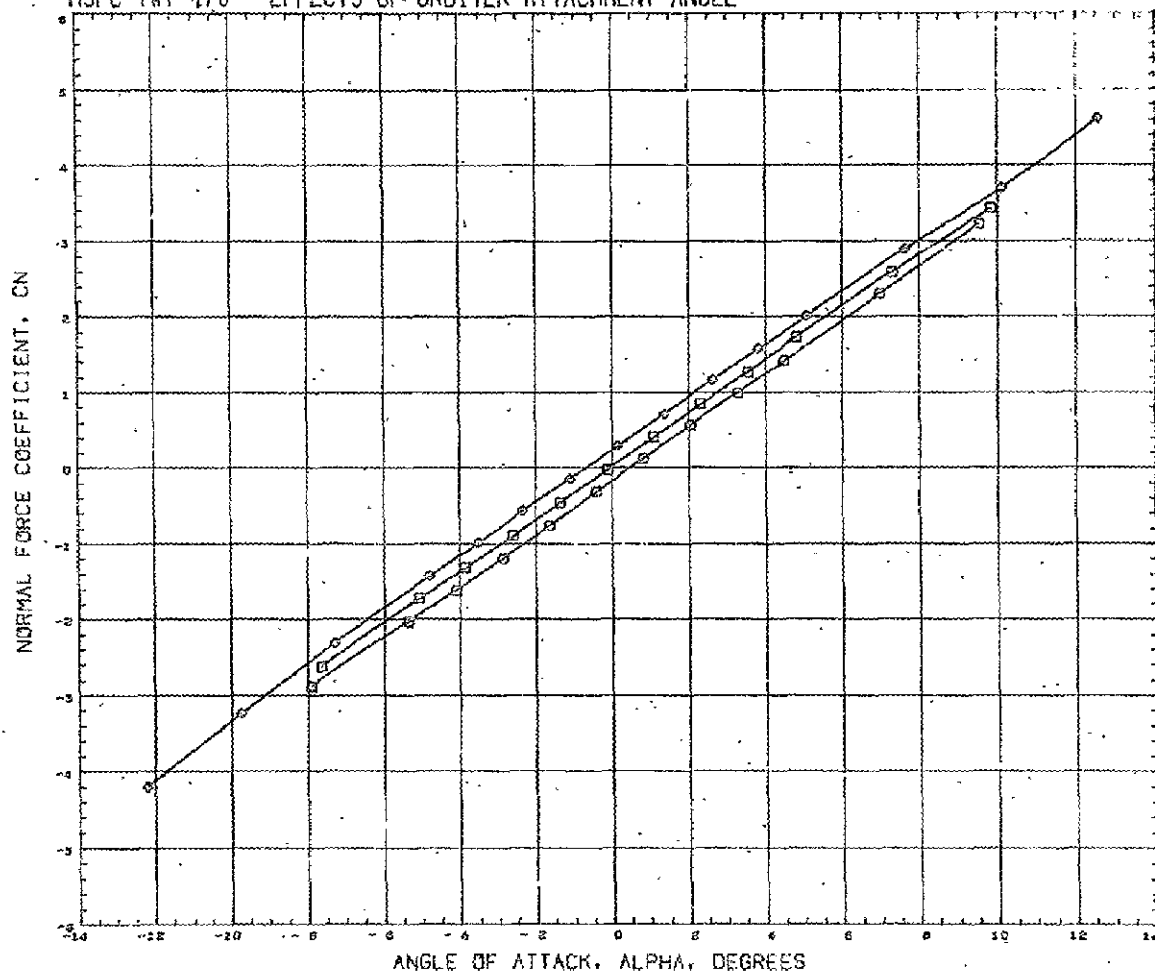


SYMBOL	ORBINC	PARAMETRIC VALUES			
○	4.000	MACH	1.458	BETA	-0.050
□	2.000	WINGINC	4.000	HTAIL	0.000
◇	0.000	PHIB	0.000		

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE



SYMBOL	ORRINC	PARAMETRIC VALUES	REFERENCE INFORMATION
\square	4.000 MACH	4.950 BETA - 0.050	REFS 1.3300 50.1N.
\diamond	2.000 MACH	4.000 HTAIL 0.000	REFL 1.3330 INCHES
\circ	0.000 MACH		REFD 1.3330 INCHES
			XNRP 5.2840 INCHES
			YNRP 0.0000 INCHES
			ZNRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

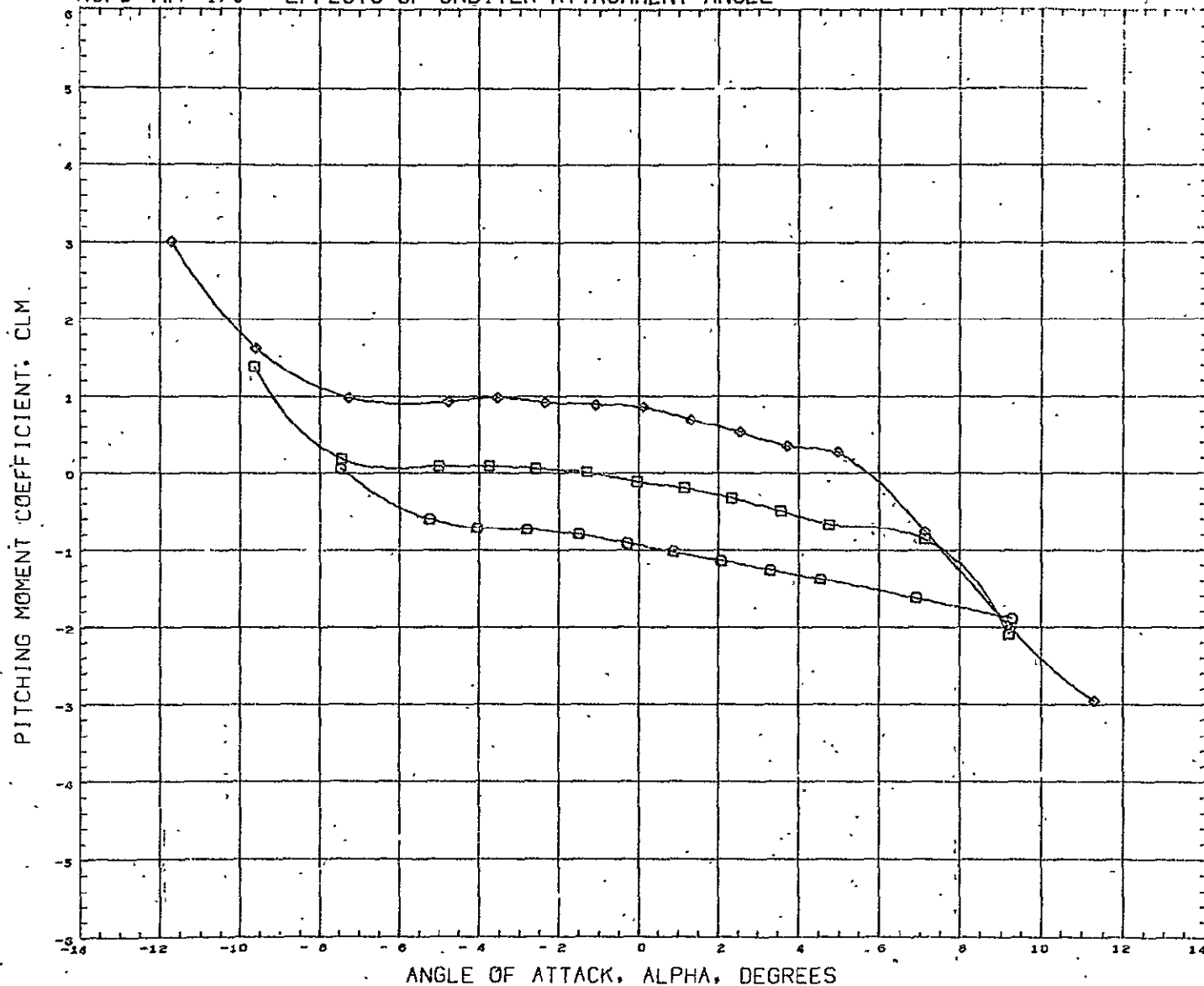
REFERENCE FILE

TWT470 S-IC/GAC ORBITER BF10WHVS FINS ON

(A24041) 26 JAN 71

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MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE



SYMBOL	ORBINC	PARAMETRIC VALUES			
○	4.000	HACH	0.597	BETA	0.050
□	2.000	WNGINC	4.000	HTAIL	0.000
◇	0.000	PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	sq.in.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XRRP	5.2640	INCHES
YRRP	0.0000	INCHES
ZRRP	0.0000	INCHES
SCALE	0.3366	PERCENT

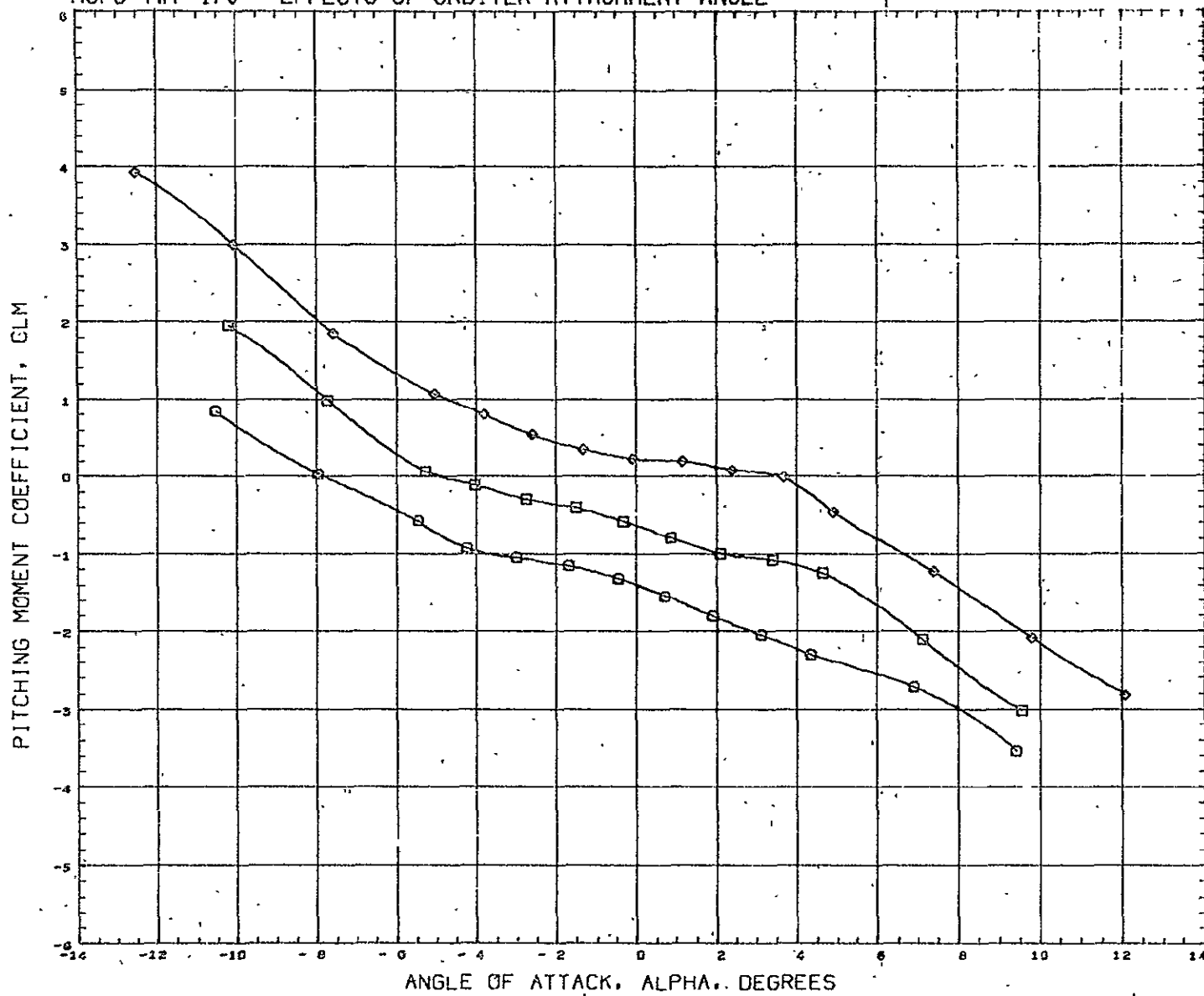
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TWT470 S-IC/GAC ORBITER BF10WHVS FINS ON

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MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

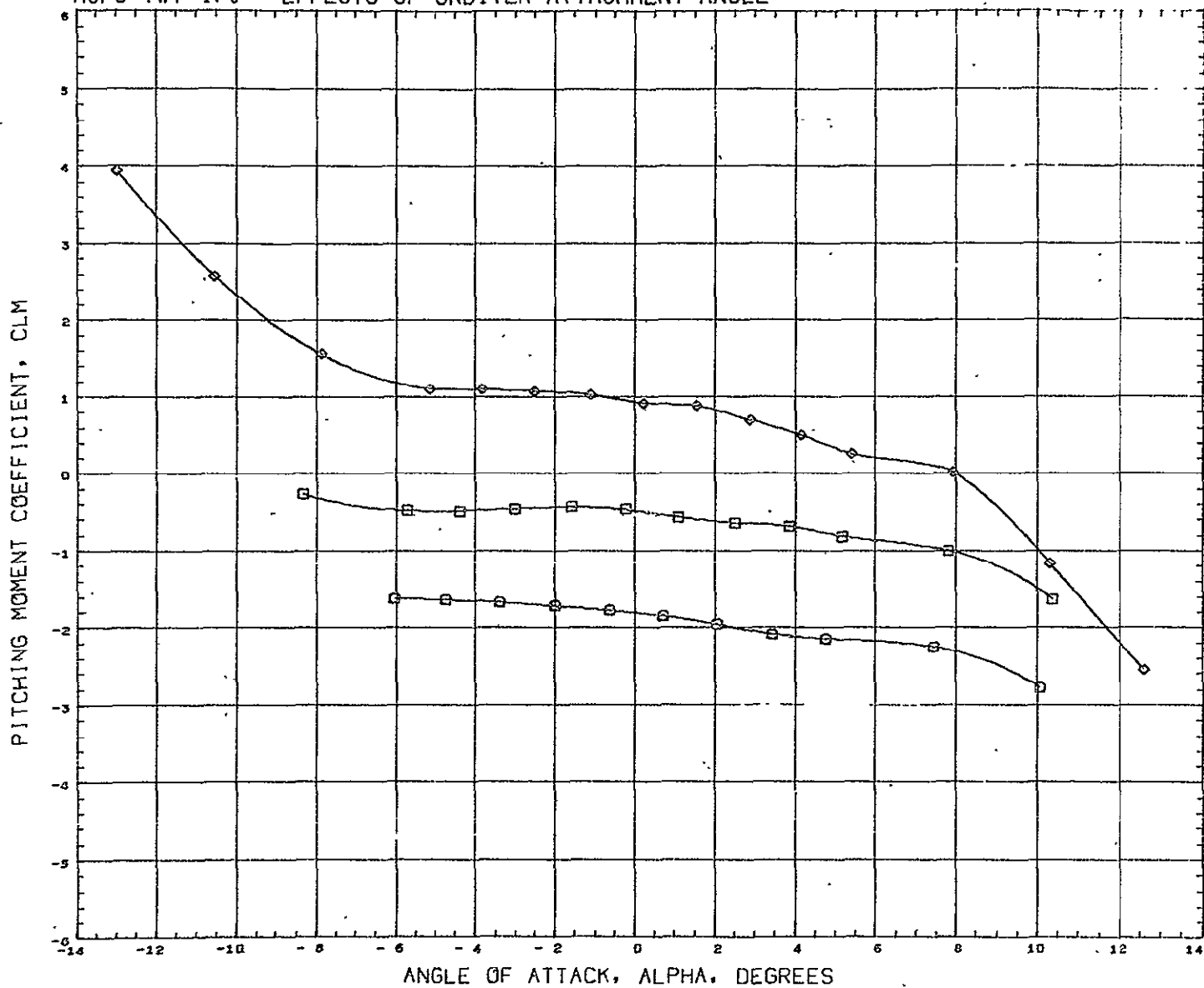


SYMBOL	ORBITER	PARAMETRIC VALUES
○	4.000	NACH 0.901 BETA - 0.050
□	2.000	WINGINC 4.000 HTAIL 0.000
◇	0.000	FNIB 0.000

REFERENCE INFORMATION		
REFS	1.3960	50.1N.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

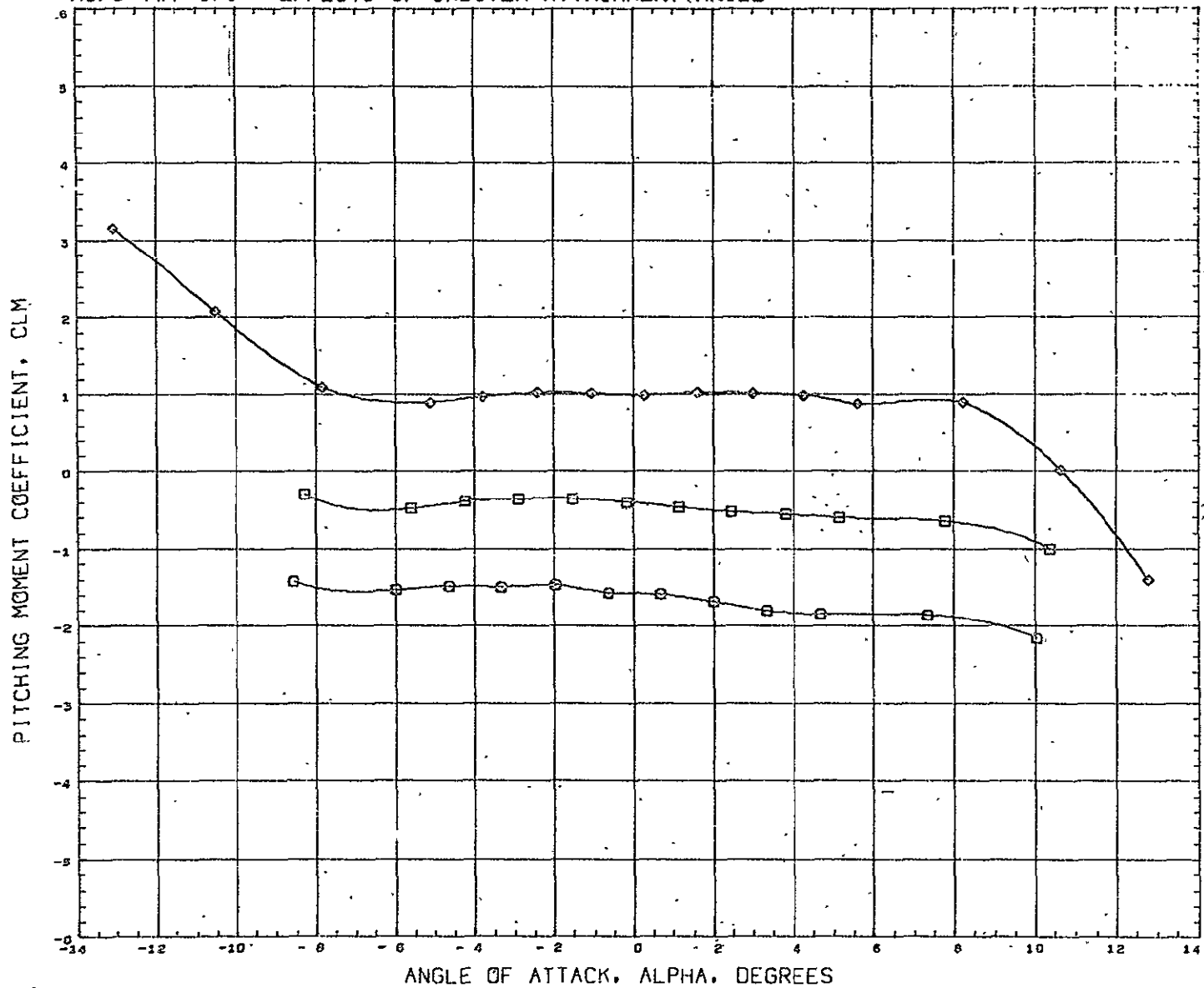


SYMBOL	ORBINC	PARAMETRIC VALUES			
□	- 4.000	NACH	1.000	BETA	- 0.050
□	- 2.000	WNGINC	4.000	HTAIL	0.000
◇	0.000	PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	-5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

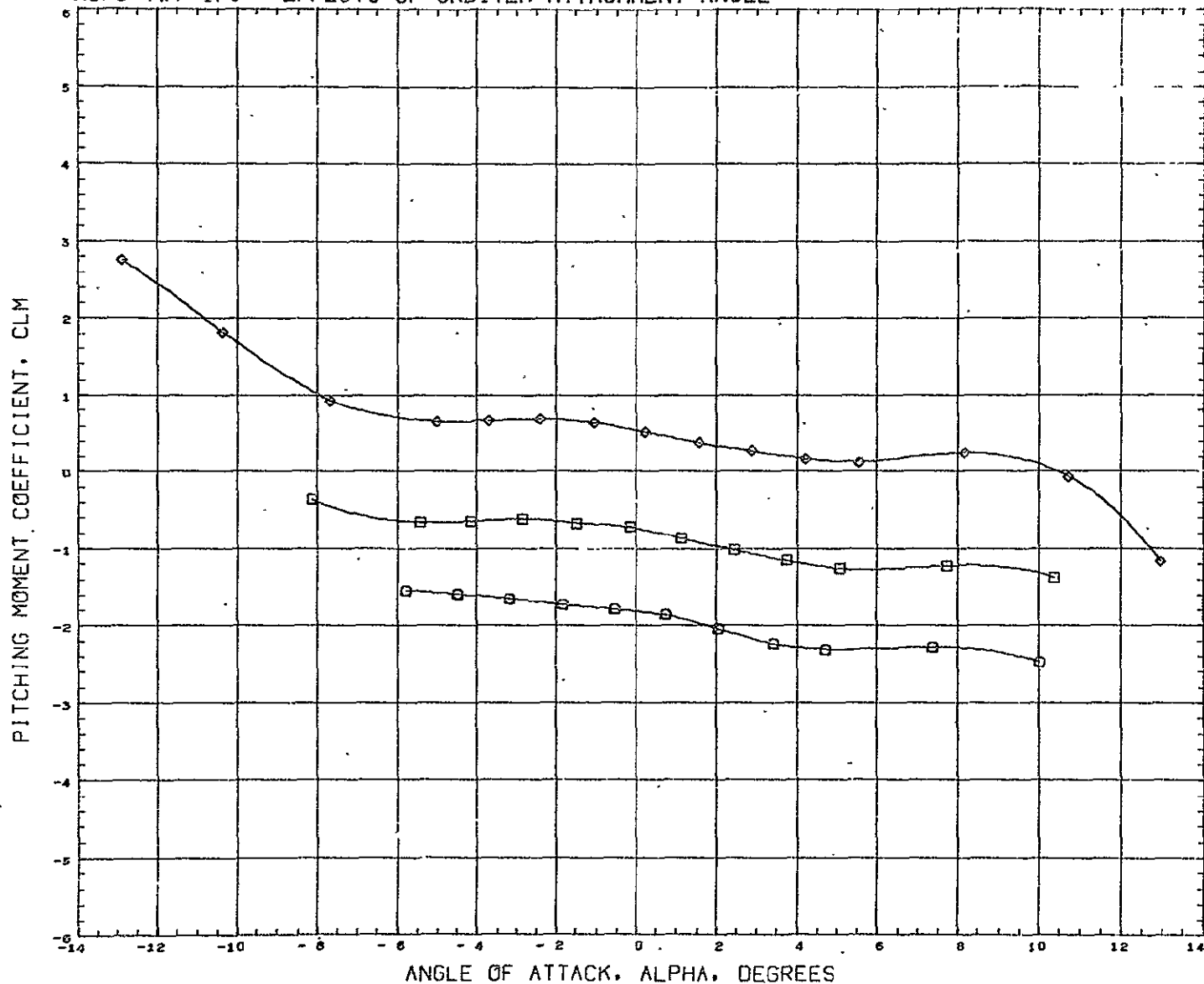


SYMBOL	ORBITER	PARAMETRIC VALUES
○	4.000 MACH	1.098 BETA - 0.050
□	2.000 WING INC	4.000 HTAIL 0.000
◇	0.000 PHIB	0.000

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE



SYMBOL		ORBITER		PARAMETRIC VALUES			
○	-	4.000	MACH	1.193	BETA	-	0.050
□	-	2.000	WINGINC	4.000	HTAIL		0.000
◇	-	0.000	PHIB	0.000			

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2040	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

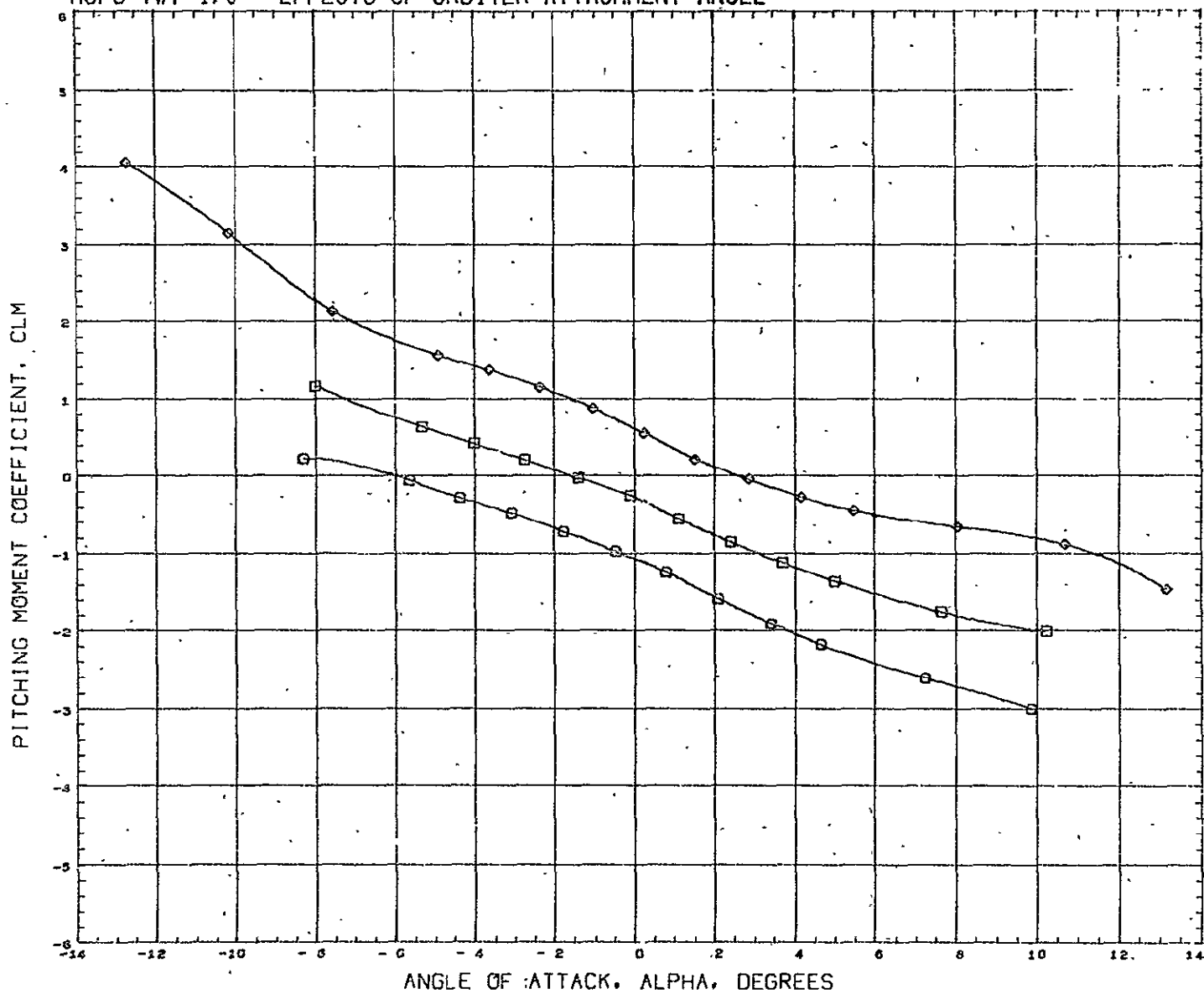
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TWT470 S-IC/GAC ORBITER BF10WHVS FINS ON

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MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

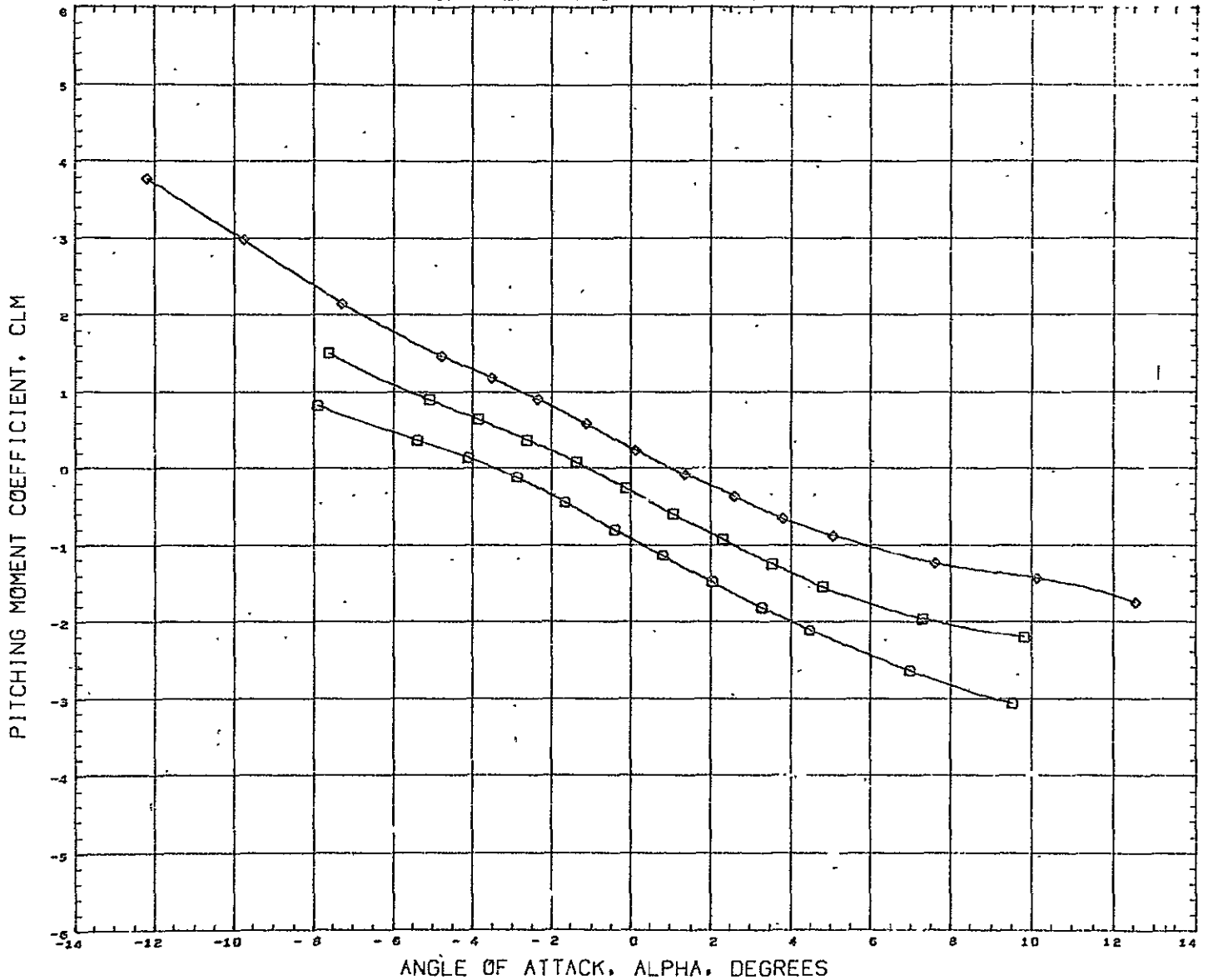


SYMBOL	ORBINC	PARAMETRIC VALUES
○	4.000	MACH 1.458 BETA - 0.050
□	2.000	WINGINC 4.000 HTAIL 0.000
◇	0.000	PHIB 0.000

REFERENCE INFORMATION		
REFS	1.3960	SQ.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE



SYMBOL		ORBITER		PARAMETRIC VALUES			
○	-	4.000	MACH	1.950	BETA	-	0.050
□	-	2.000	WINGINC	4.000	HTAIL		0.000
◇		0.000	PHIB	0.000			

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

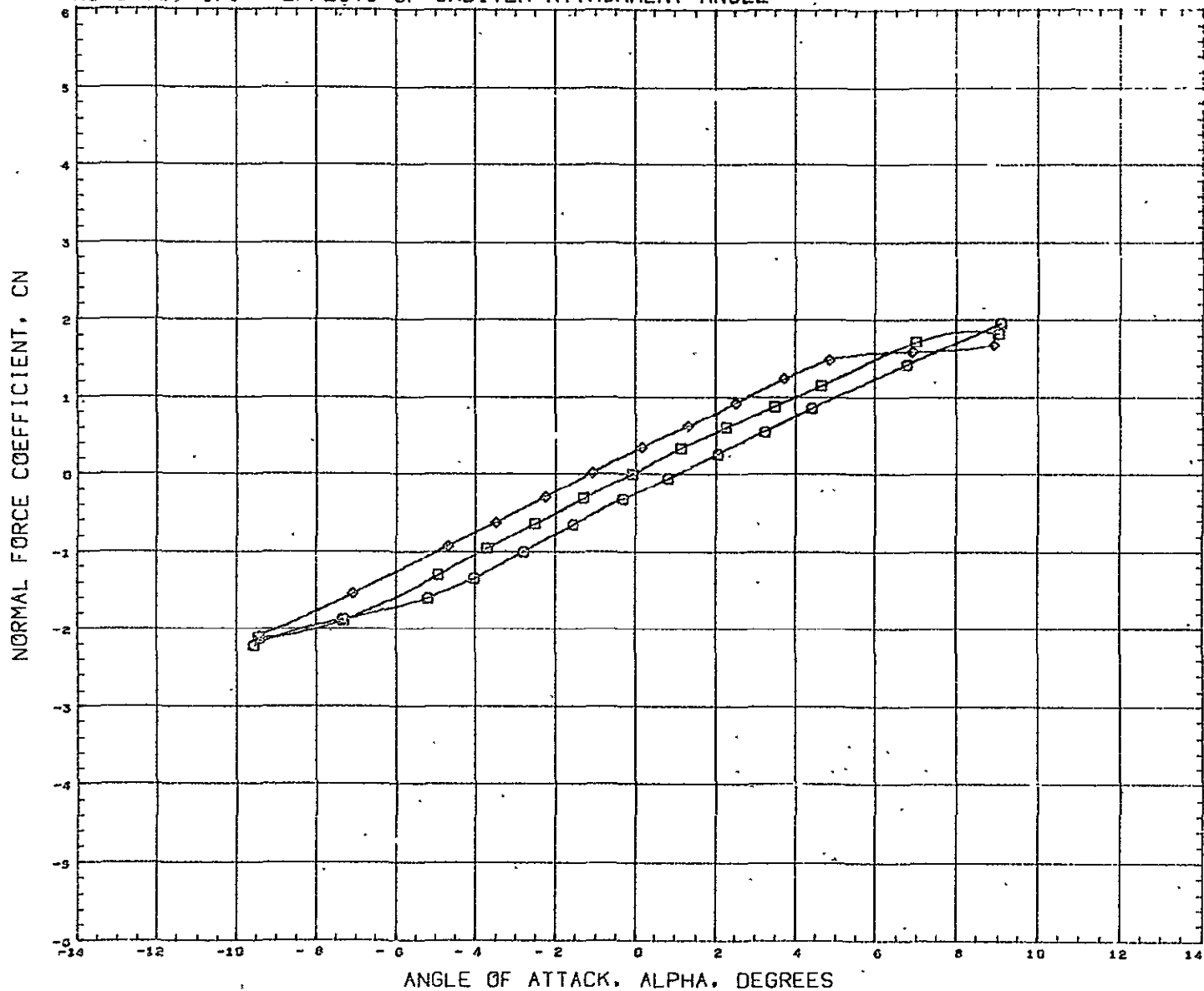
REFERENCE FILE

TWT470 S-IC/GAC ORBITER BF10WHVS FINS ON

(A24041) 26 JAN 71

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MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

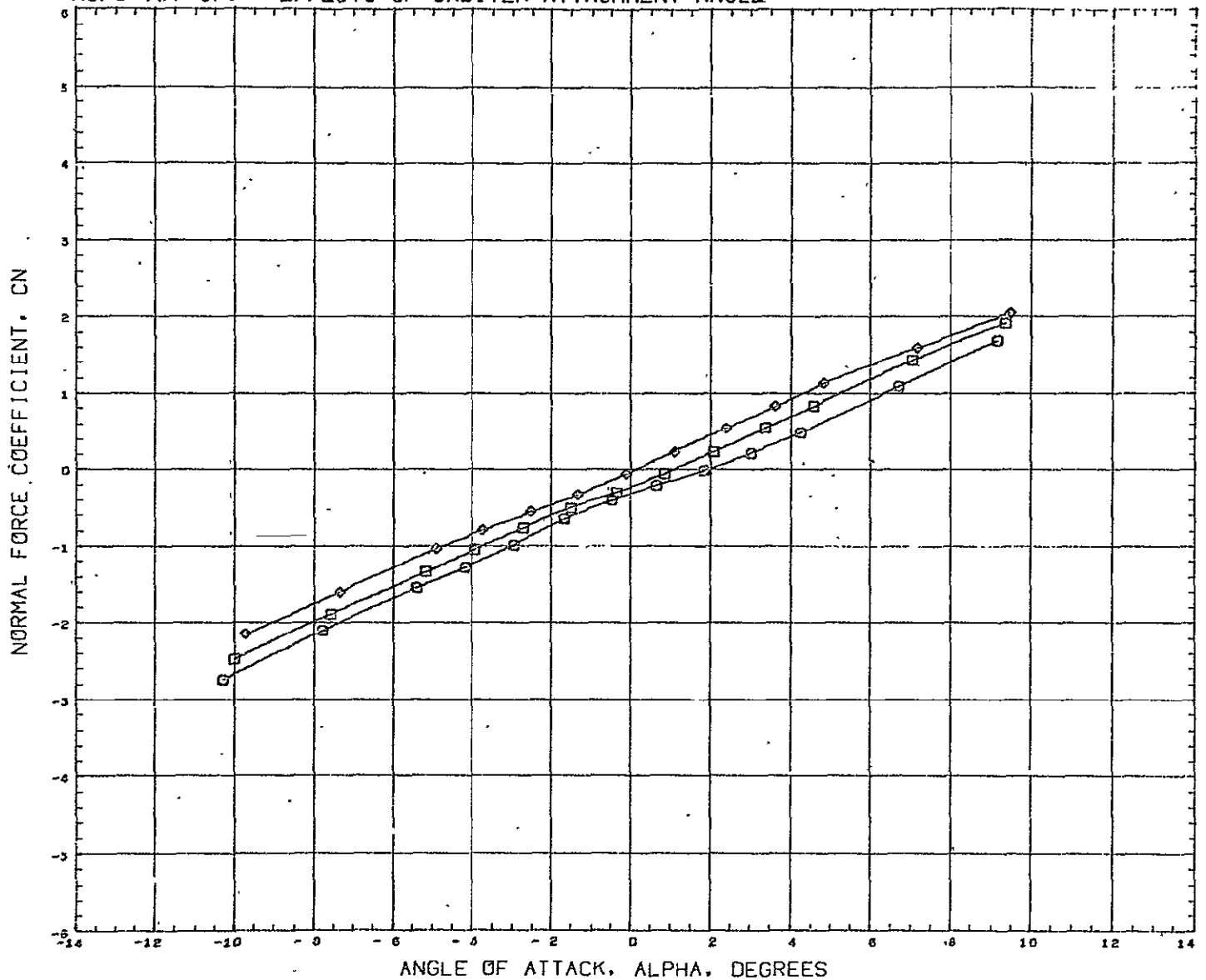


SYMBOL	ORBITER	PARAMETRIC VALUES			
\diamond	0.000	MACH	0.599	BETA	- 0.040
\square	2.000	WINGINC	4.000	HTAIL	0.000
\circ	4.000	PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3356	PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

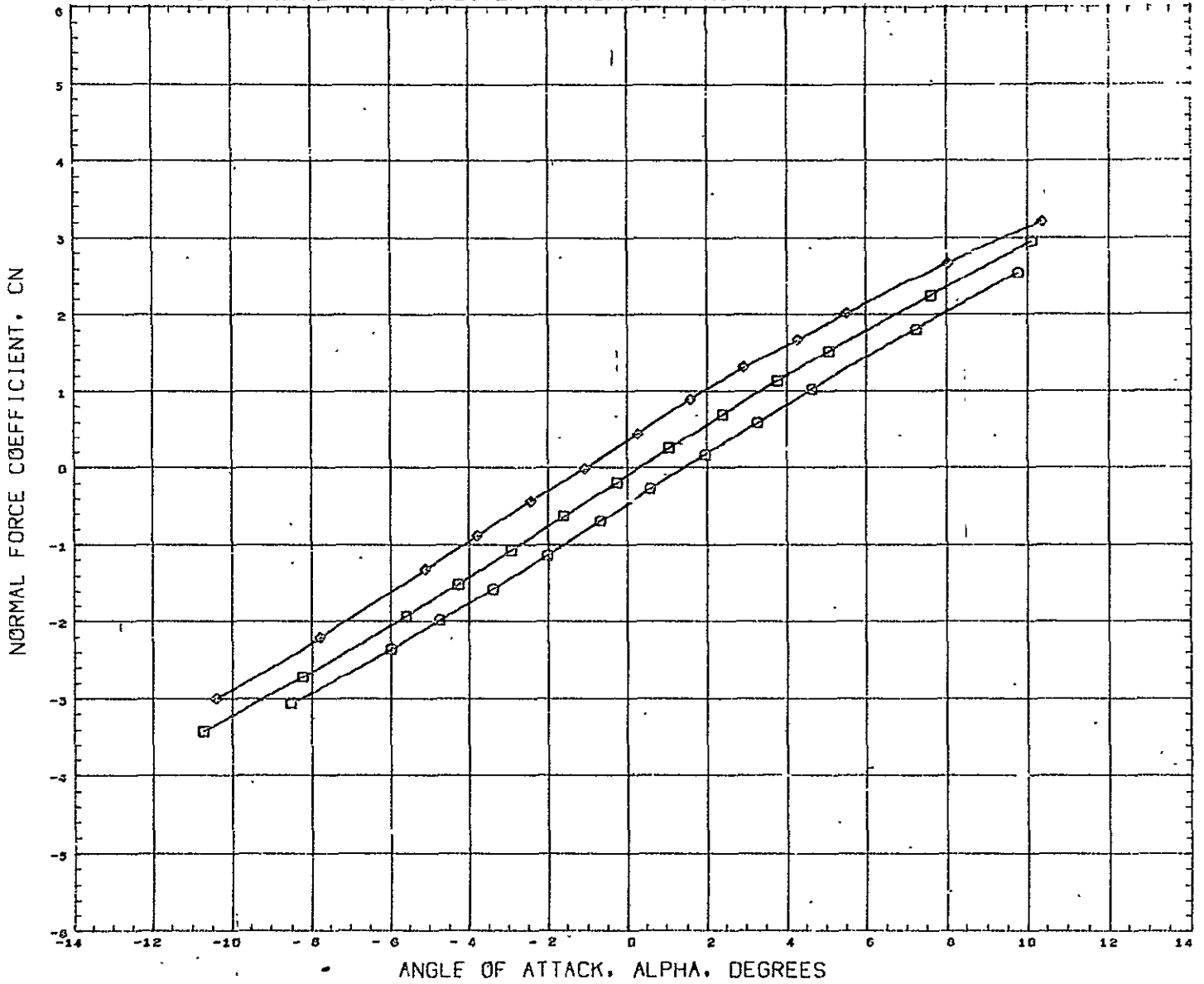


SYMBOL		ORBITER	PARAMETRIC VALUES			
○	-	4.000	MACH	0.900	BETA	- 0.040
□	-	2.000	WINGINC	4.000	HTAIL	0.000
◇	-	0.000	PHID	0.000		

REFERENCE INFORMATION		
REFS	1.3960	88. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

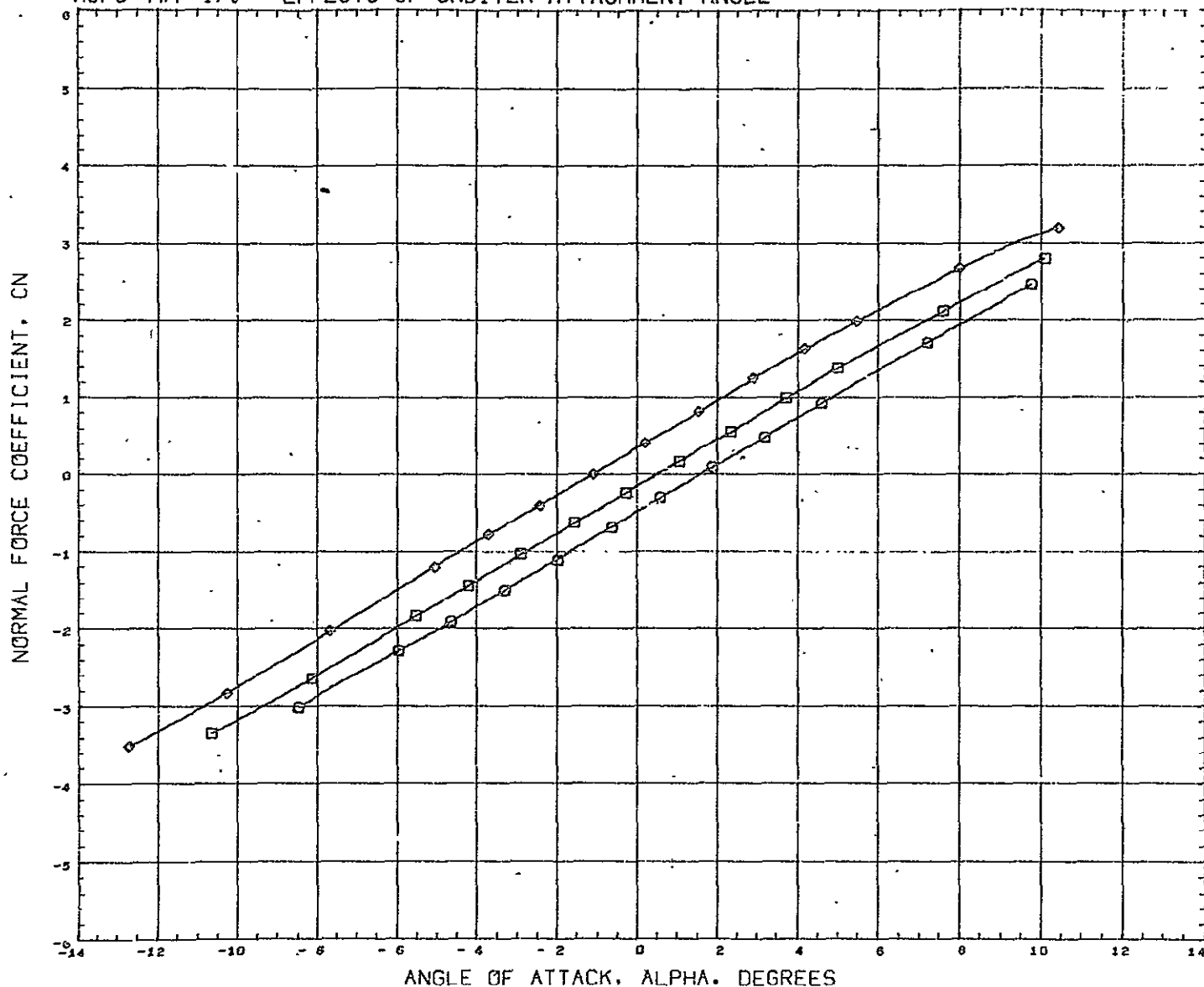


SYMBOL	ORBITER	PARAMETRIC VALUES			
○	4.000	MACH	0.997	BETA	0.040
□	2.000	WINGINC	4.000	NTAIL	0.000
◇	0.000	PHIS	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

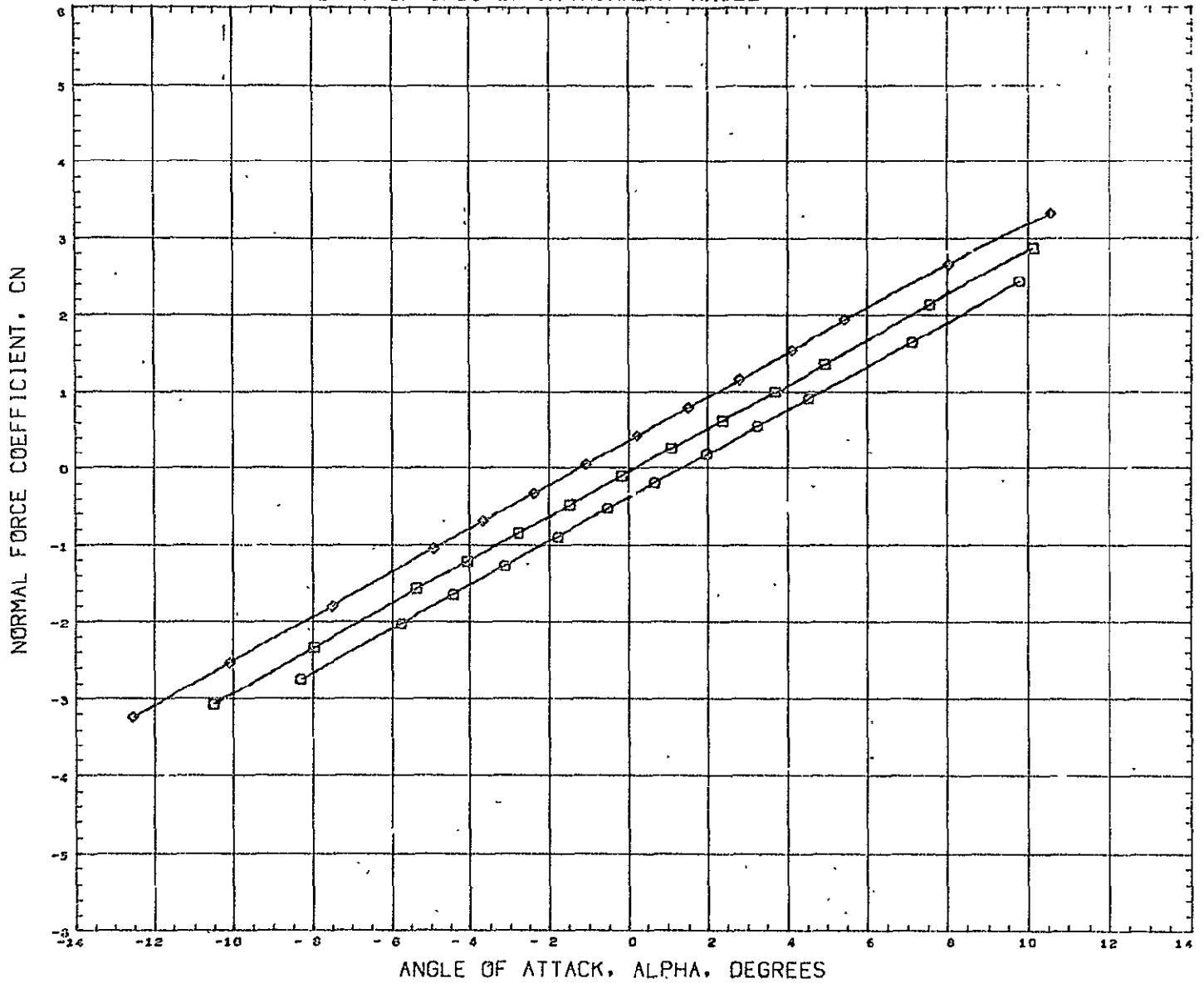


SYMBOL		ORDINC		PARAMETRIC VALUES			
◇	-	4.000	MACH	1.100	BETA	-	0.040
□	-	2.000	WINGINC	4.000	HTAIL		0.000
○		0.000	PHIS	0.000			

REFERENCE INFORMATION		
REFS	1.3960	SQ.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470. EFFECTS OF ORBITER ATTACHMENT ANGLE

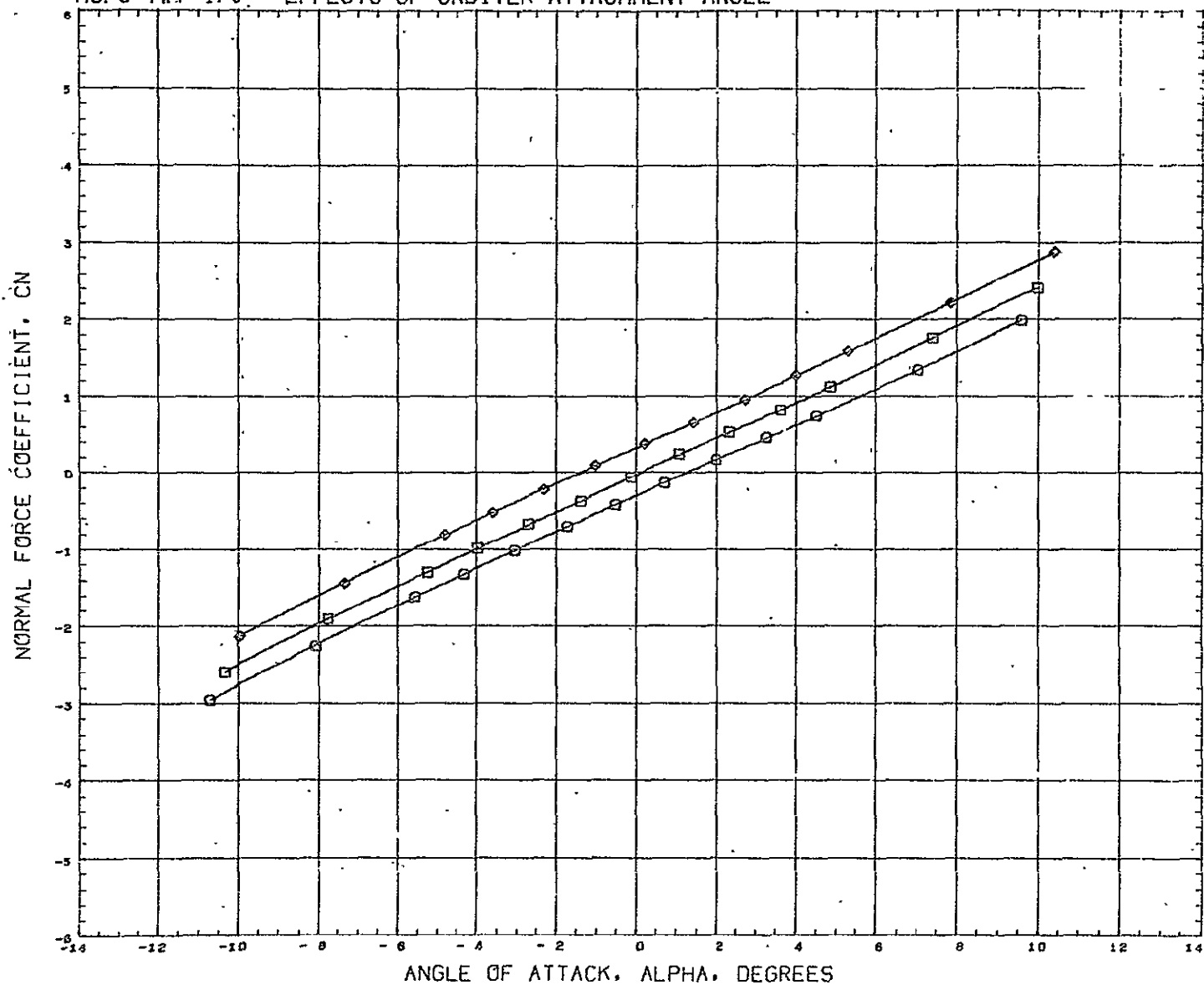


SYMBOL	ORDINC	PARAMETRIC VALUES			
○	4.000	HACH	1.199	BETA	- 0.040
□	2.000	WNGINC	4.000	HTAIL	0.000
◇	0.000	PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3530	INCHES
REFB	1.3530	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

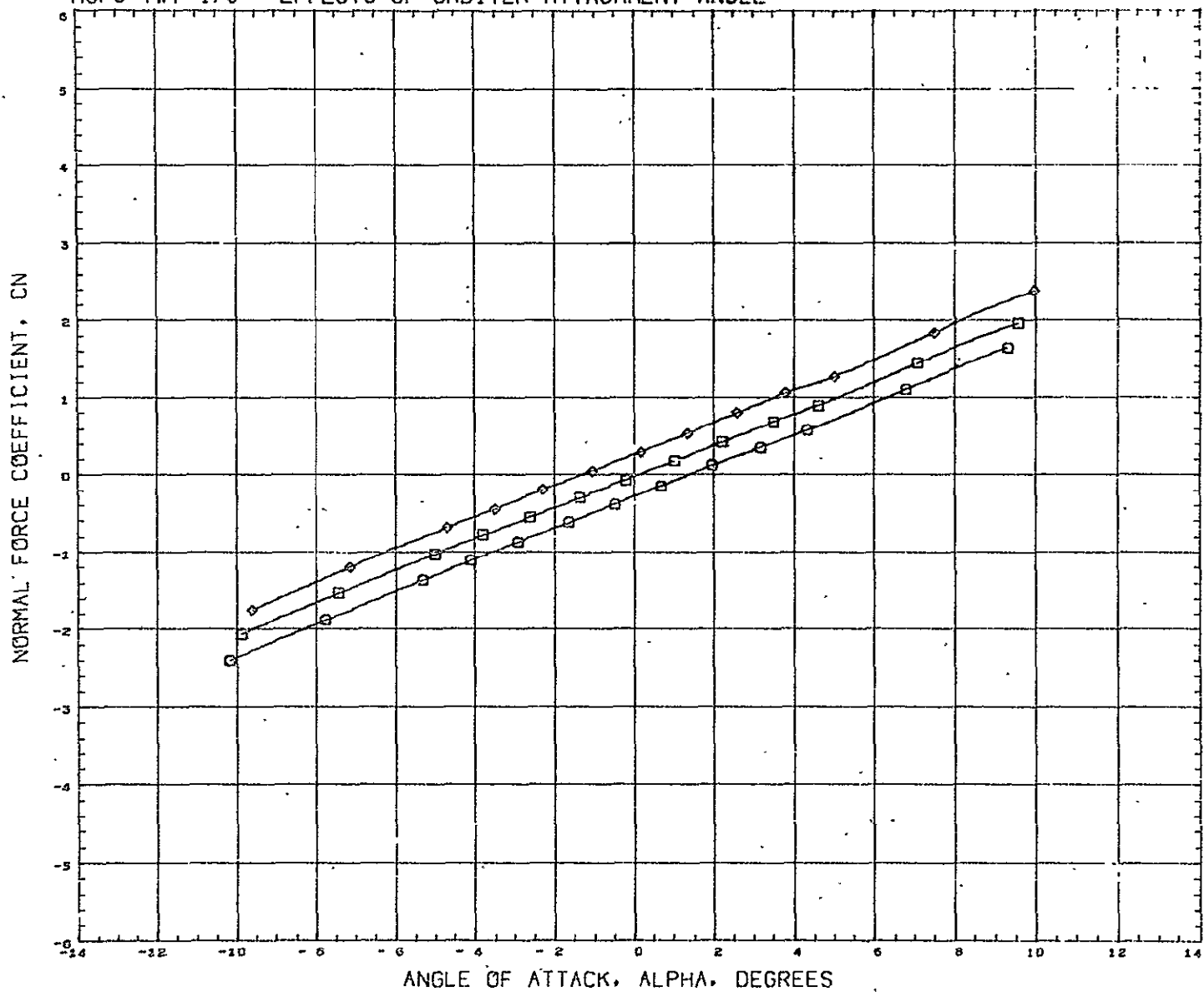


SYMBOL		ORBITER		PARAMETRIC VALUES			
○	-	4.000	MACH	1.460	BETA	-	0.040
□	-	2.000	WINGINC	4.000	HTAIL		0.000
◇	-	0.000	PHIB	0.000			

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

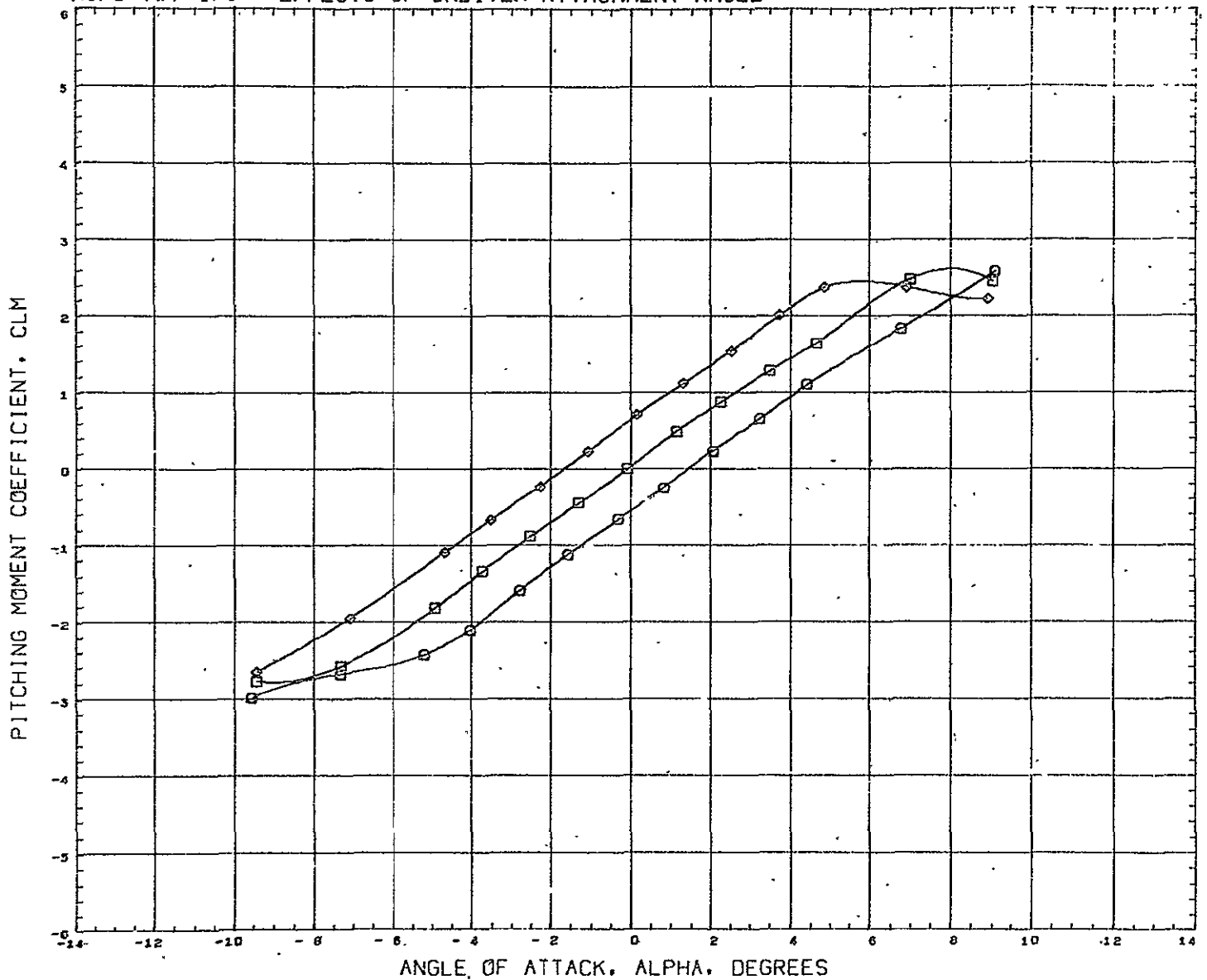


SYMBOL	ORBITER	PARAMETRIC VALUES
○	4.000	NACH 1.952 BETA 0.040
□	2.000	VNGINC 4.000 NTAIL 0.000
◇	0.000	FHIB 0.000

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	3.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

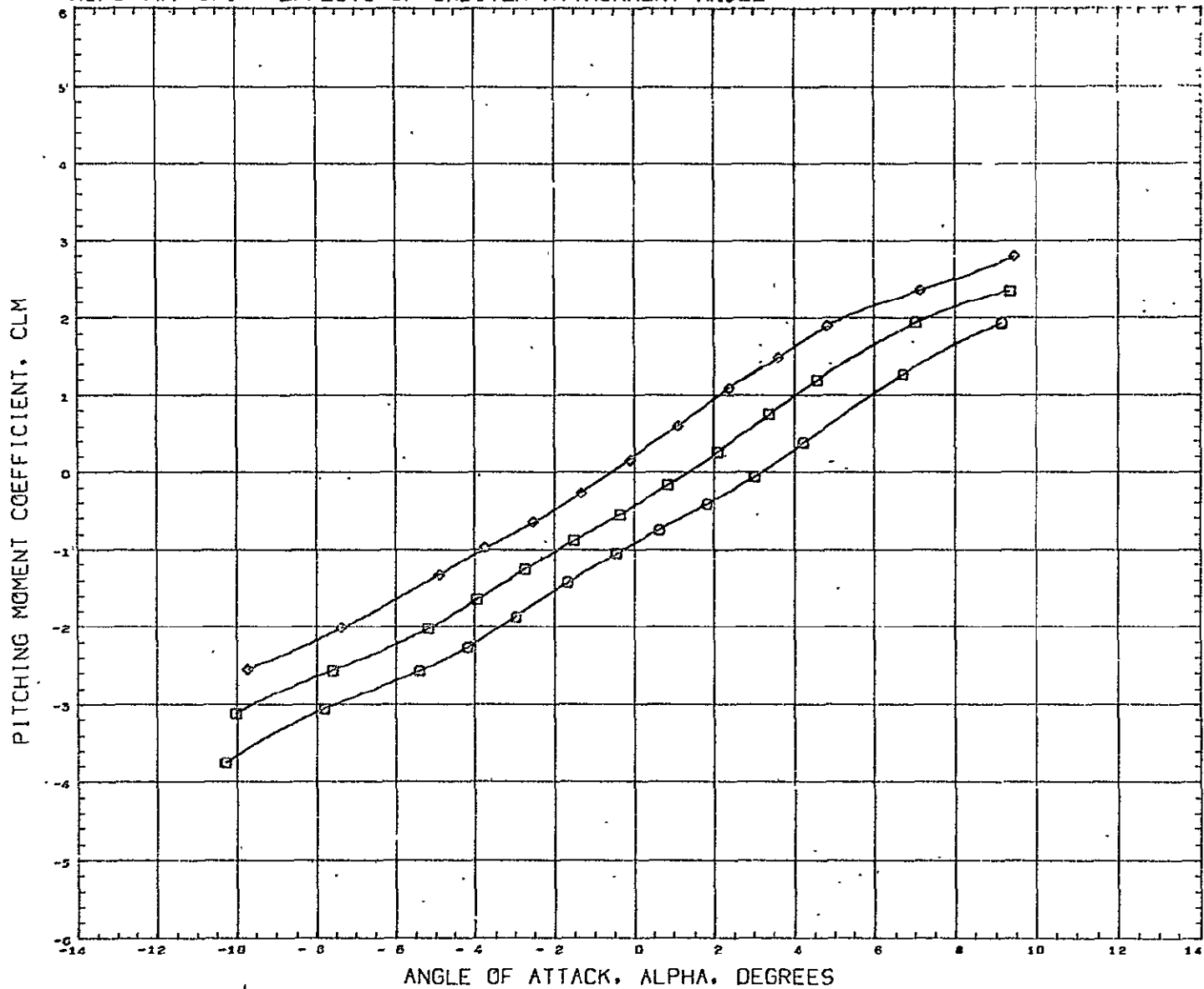


SYMBOL	ORBITER	PARAMETRIC VALUES			
◇	- 4.000	MACH	0.599	BETA	- 0.040
□	- 2.990	WINGINC	4.000	HTAIL	0.000
○	0.000	PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

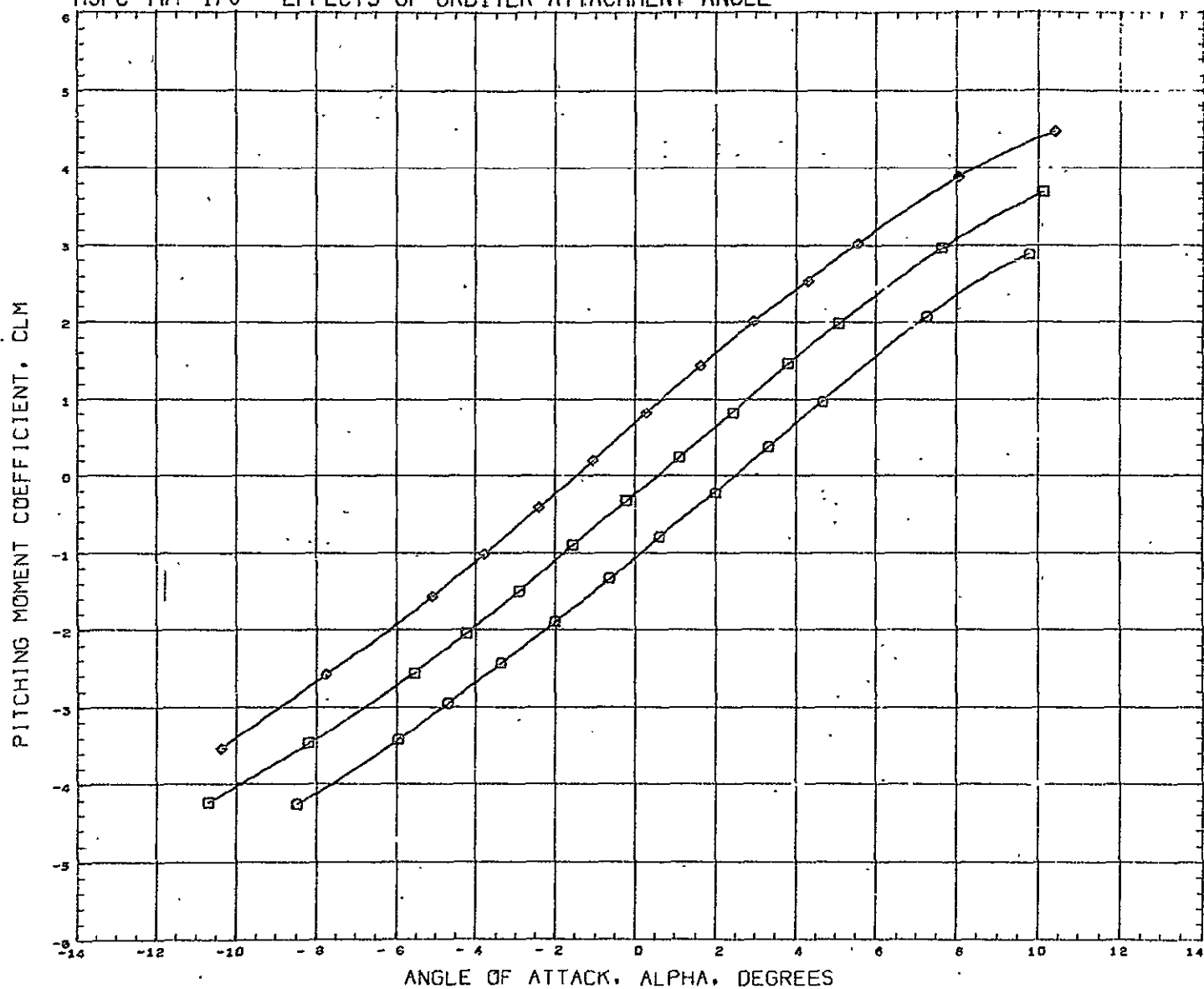


SYMBOL		ORBITER		PARAMETRIC VALUES	
○	4.000	MACH	0.900	BETA	-0.040
□	2.000	WINGINC	4.000	HTAIL	0.000
◇	0.000	PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

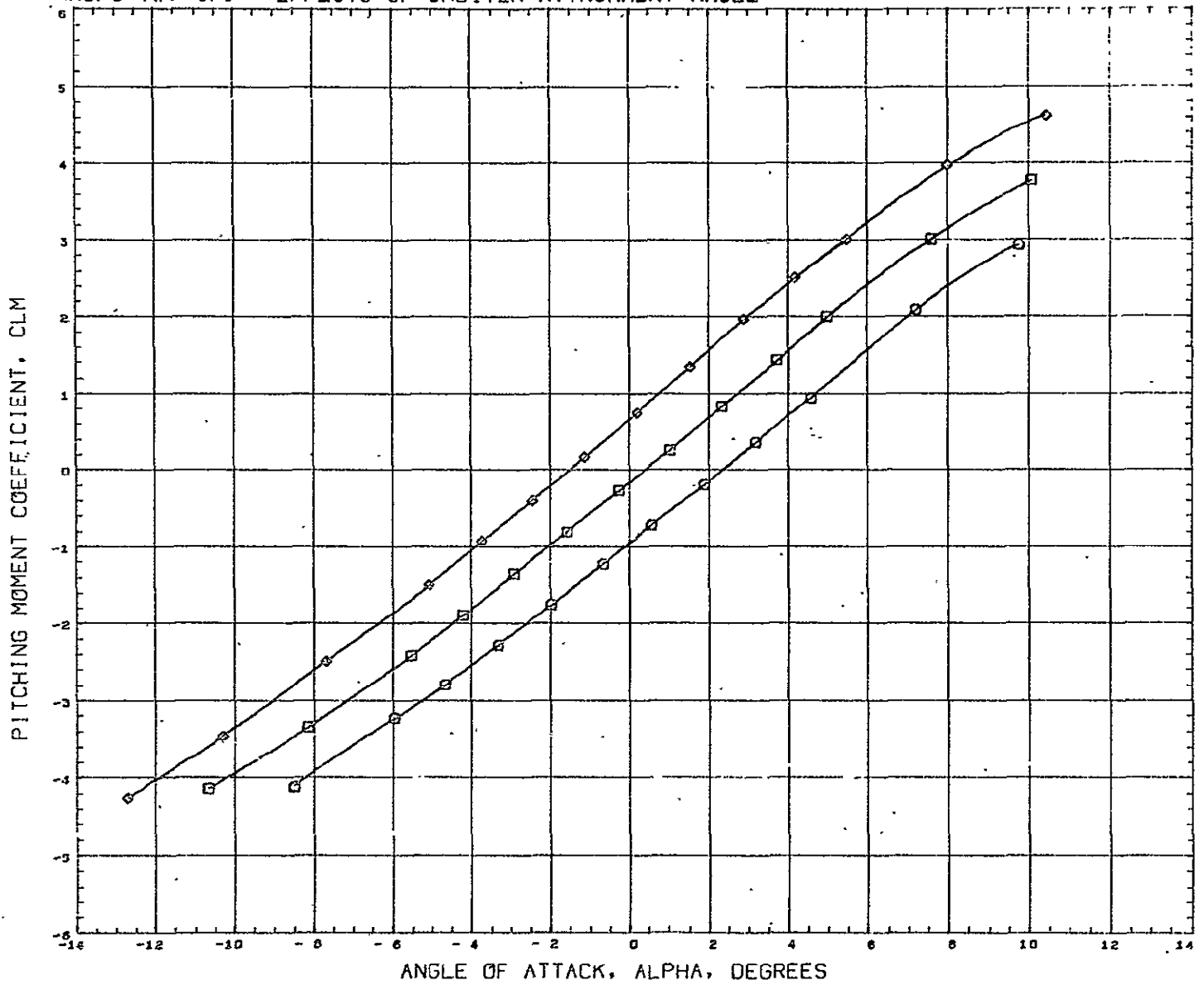


SYMBOL	ORBITER	PARAMETRIC VALUES
◇	4.000	MACH 0.997 BETA - 0.040
□	2.000	WHG INC 4.000 HTAIL 0.090
○	0.000	PHIB 0.000

REFERENCE INFORMATION		
REFS	1.3960	50. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

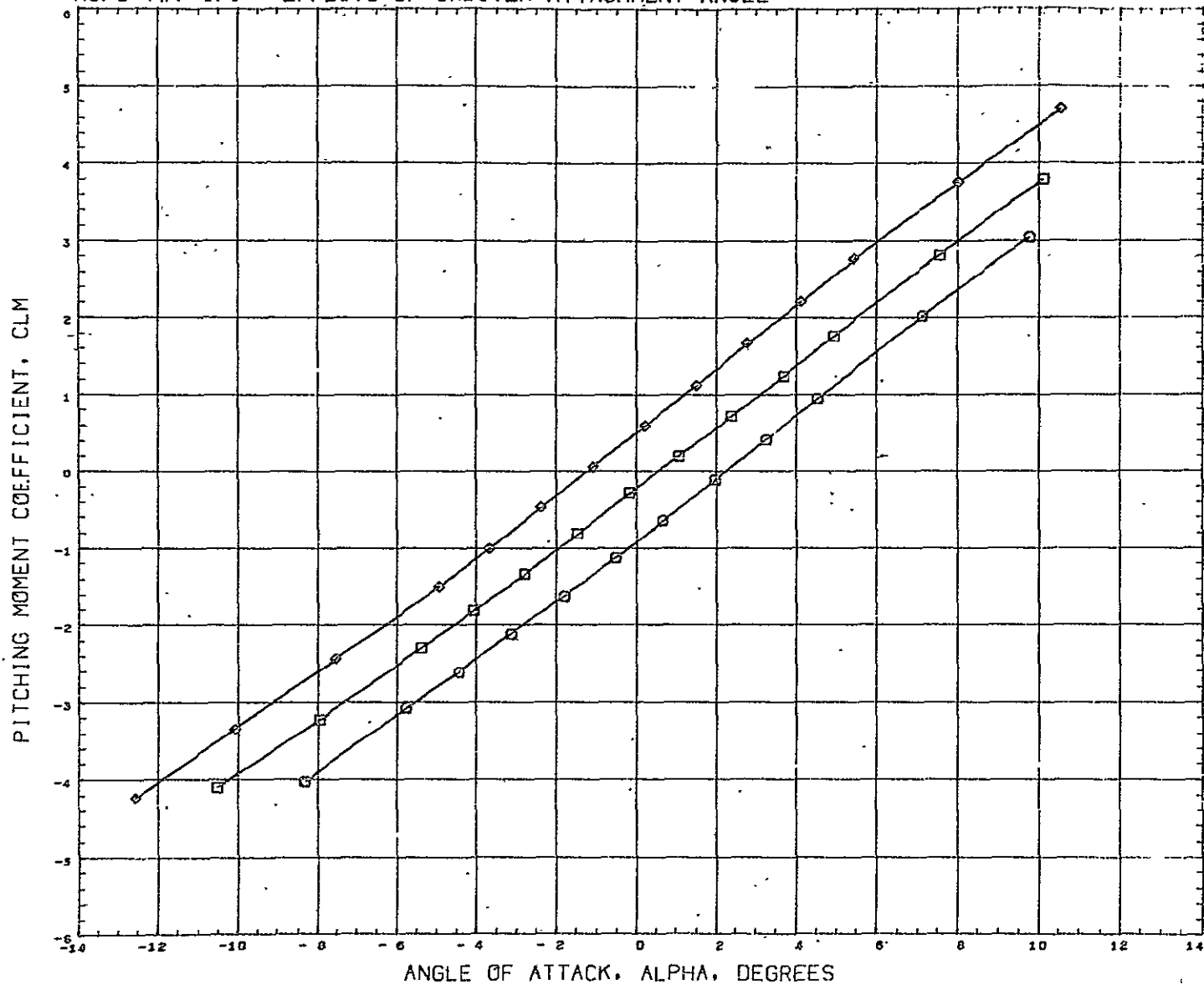


SYMBOL	ORBITER	PARAMETRIC VALUES
○	4.000	HACH 1.100 BETA - 0.040
□	2.000	WNGINC 4.000 HTAIL 0.000
◇	0.000	PHIB 0.000

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

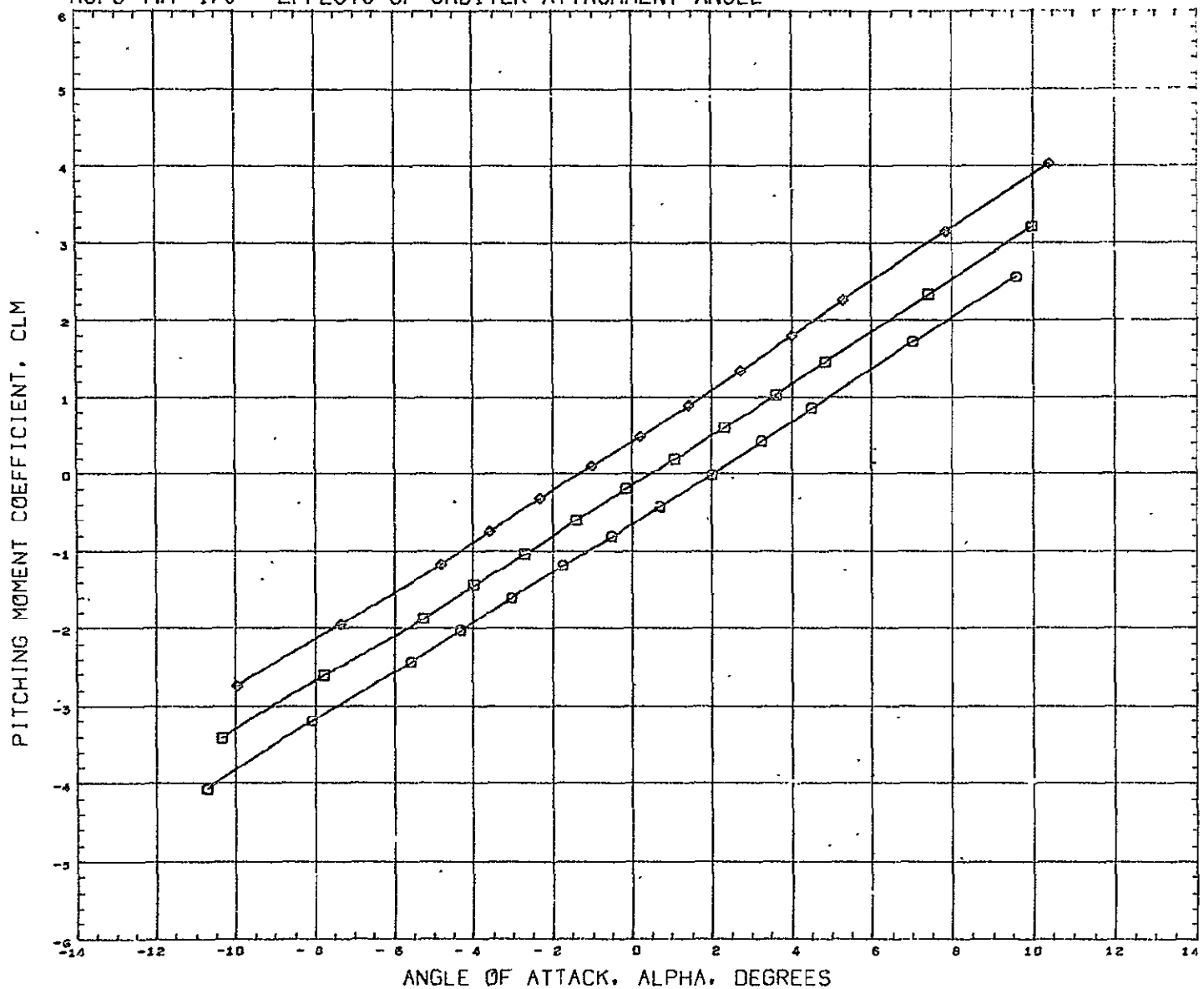


SYMBOL		ORBITER		PARAMETRIC VALUES			
◇	-	4.000	MACH	1.199	BETA	-	0.040
□	-	2.000	WINGINC	4.000	HTAIL		0.000
○		0.000	PHIB	0.000			

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

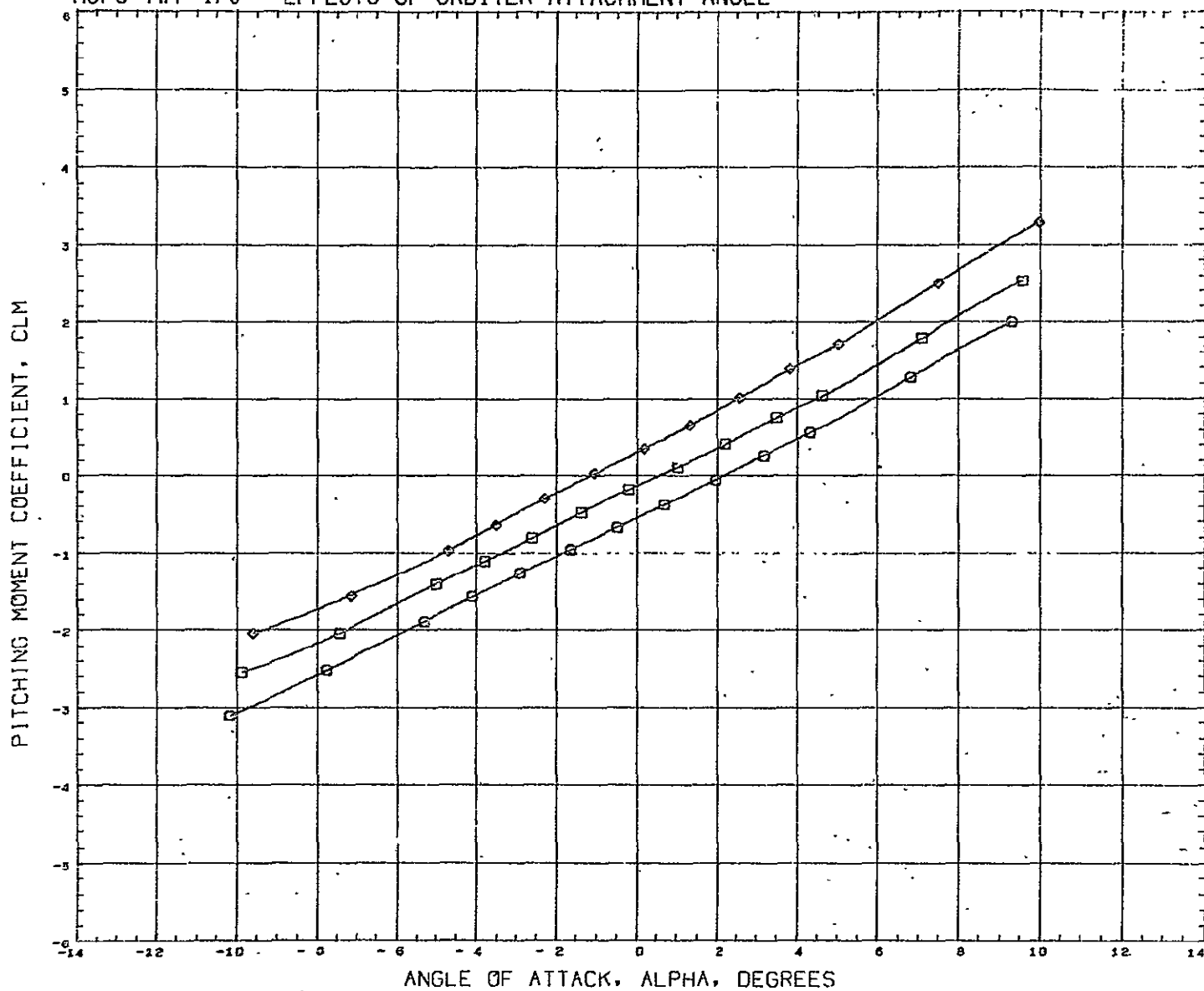
MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE



SYMBOL		PARAMETRIC VALUES				REFERENCE INFORMATION		
○	- 4.000	MACH	1.460	BETA	- 0.040	REFS	1.3960	50. IN.
□	- 2.000	WING INC	4.000	HTAIL	0.000	REFL	1.3330	INCHES
◇	0.000	PHIB	0.000			REFB	1.3330	INCHES
						XMRP	5.2640	INCHES
						YMRP	0.0000	INCHES
						ZMRP	0.0000	INCHES
						SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

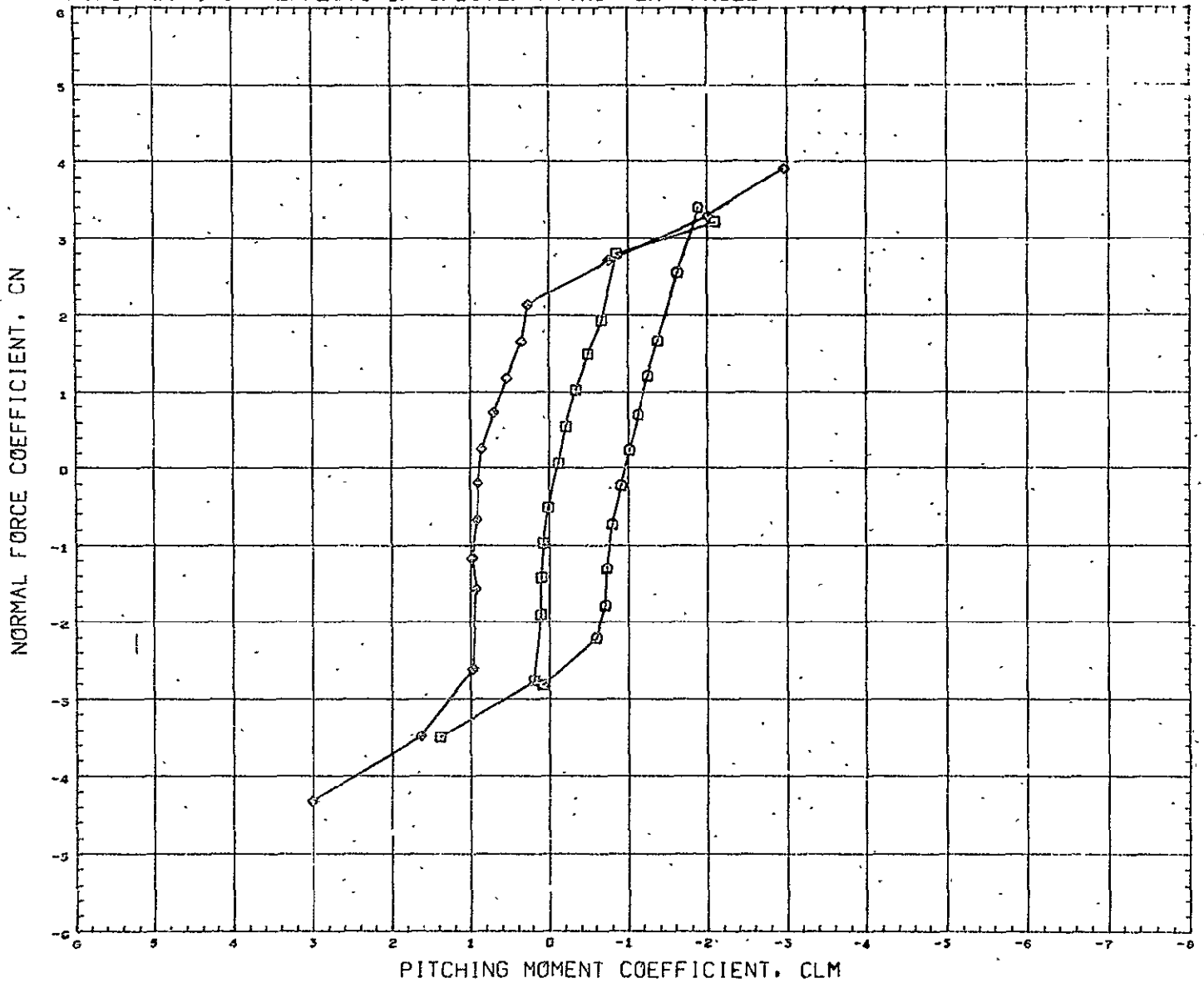


SYMBOL	ORBITER	PARAMETRIC VALUES
○	4.000	HACH 1.952 BETA - 0.040
□	2.000	WINGINC 4.000 HTAIL 0.000
◇	0.000	PHIB 0.000

REFERENCE FILE

REFERENCE INFORMATION	
REFS	1.3960 SR.IN.
REFL	1.3330 INCHES
REFB	1.3330 INCHES
XMRP	5.2640 INCHES
YMRP	0.0000 INCHES
ZMRP	0.0000 INCHES
SCALE	0.3366 PERCENT

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE



SYMBOL	ORDINC	PARAMETRIC VALUES			
□	- 4.000	HACH	0.597	BETA	- 0.050
□	- 2.000	WINGINC	4.000	MTAIL	0.000
◇	0.000	PHIB	0.000		

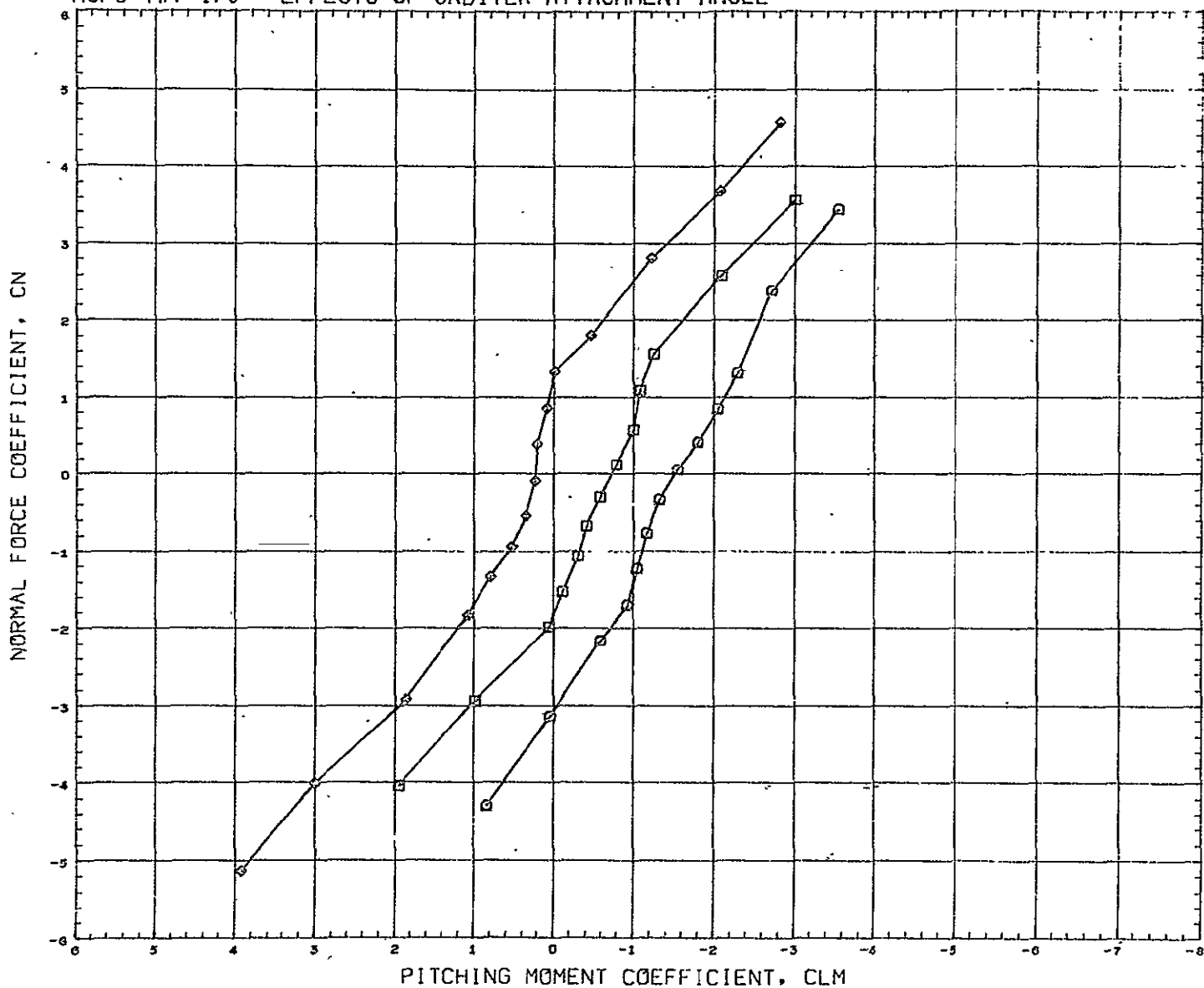
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REFL	1.3330	INCHES
REFD	1.3330	INCHES
XWRP	3.2640	INCHES
YHRF	0.0000	INCHES
ZHRF	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

TWT470 S-1C/GAC ORBITER BF10WHVS FINS ON

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MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE



SYMBOL		ORBITER	PARAMETRIC VALUES			
○	-	4.000	MACH	0.901	BETA	- 0.050
□	-	2.000	WINGINC	4.000	HTAIL	0.000
◇	-	0.000	PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRF	5.2640	INCHES
YHRF	0.0000	INCHES
ZHRF	0.0000	INCHES
SCALE	0.3366	PERCENT

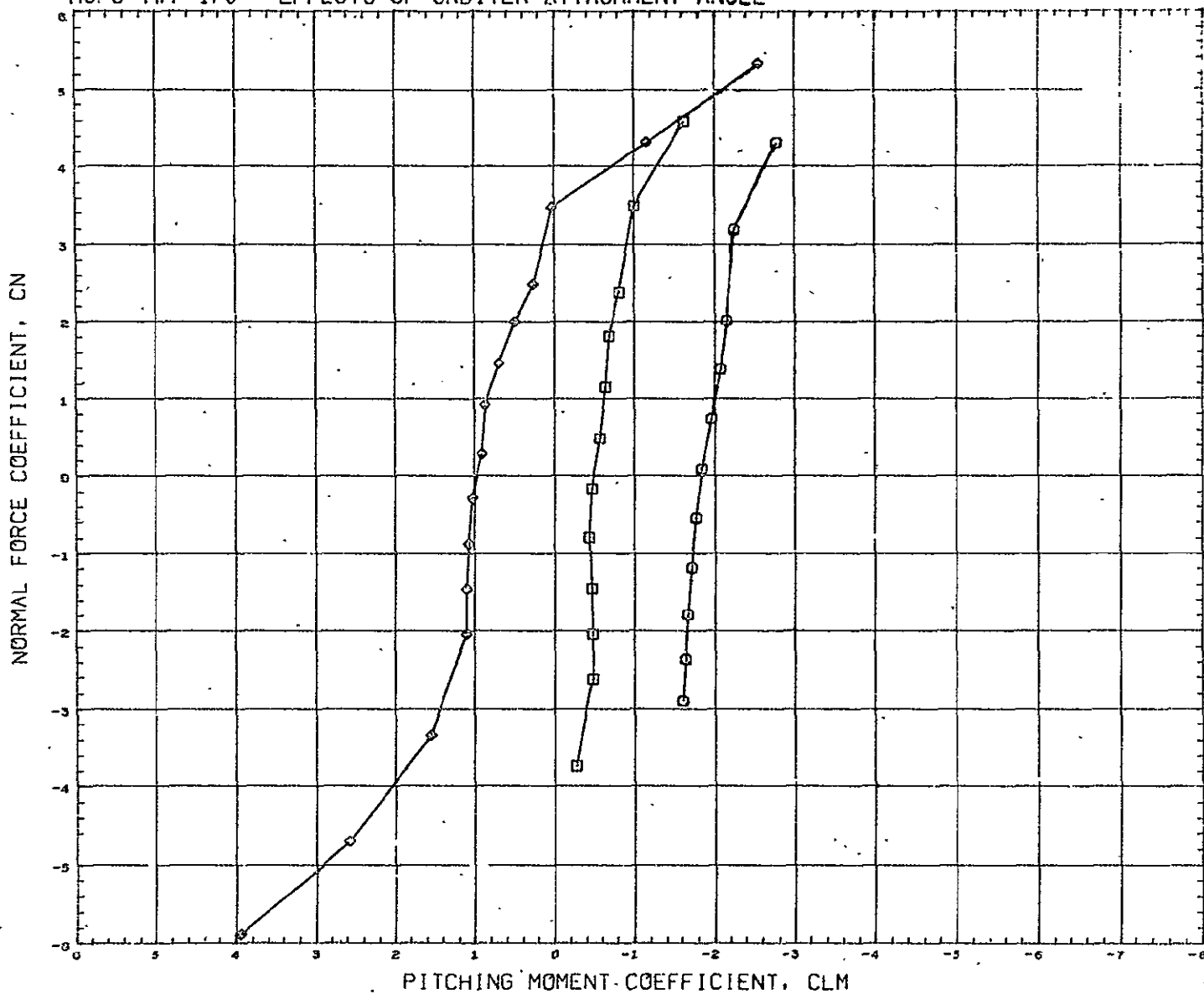
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TWT470 S-1C/GAC ORBITER BF10WHVS FINS ON

(A24041) 26 JAN 71

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MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

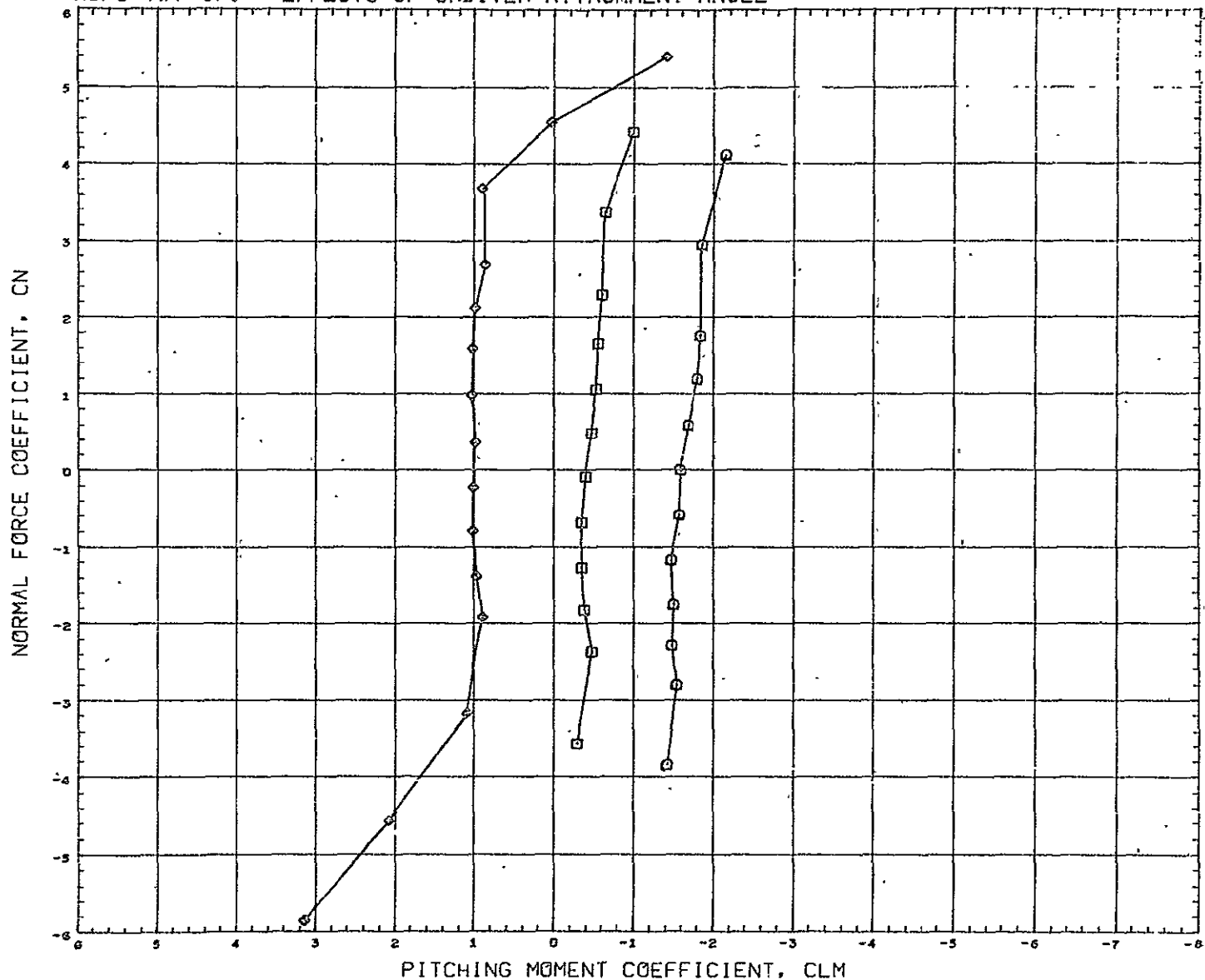


SYMBOL	ORBITER	PARAMETRIC VALUES
○	- 4.000	NACH 1.000 BETA - 0.050
□	- 2.000	WNGINC 4.000 HTAIL 0.000
◇	0.000	PHIB 0.000

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE



SYMBOL	ORBINC	PARAMETRIC VALUES			
○	- 4.000	MACH	1.008	BETA	- 0.050
□	- 2.000	WINGINC	4.000	HTAIL	0.000
◇	0.000	PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	50.1N.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

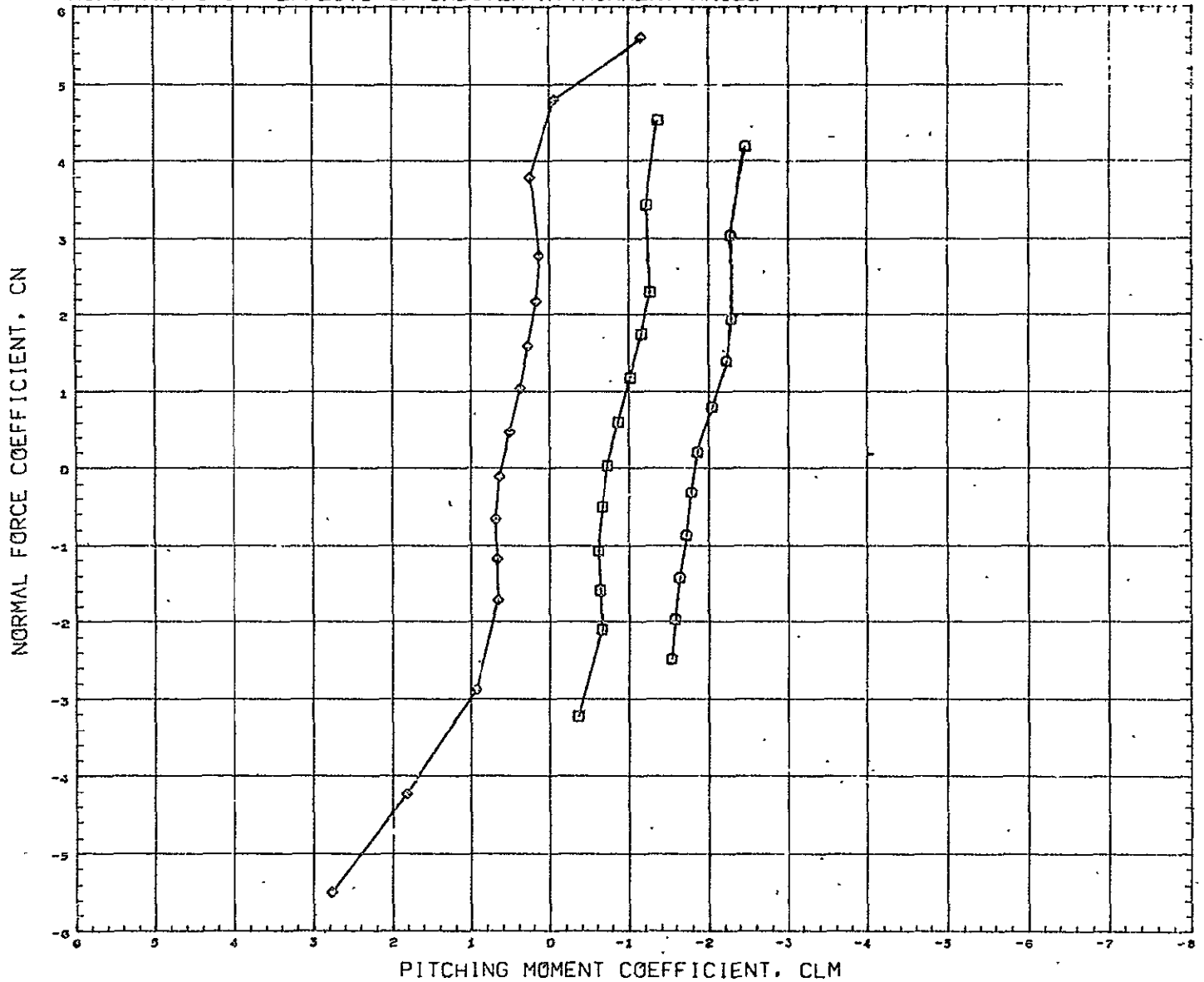
REFERENCE FILE

TWT470 S-IC/GAC ORBITER BF10WHVS FINS ON

(A24041) 26 JAN. 71

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MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE



SYMBOL	ORBITER	PARAMETRIC VALUES
◻	- 4.000	MACH 1.193 BETA - 0.050
◻	- 2.000	WINGINC 4.000 HTAIL 0.000
◊	0.000	PHIB 0.000

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

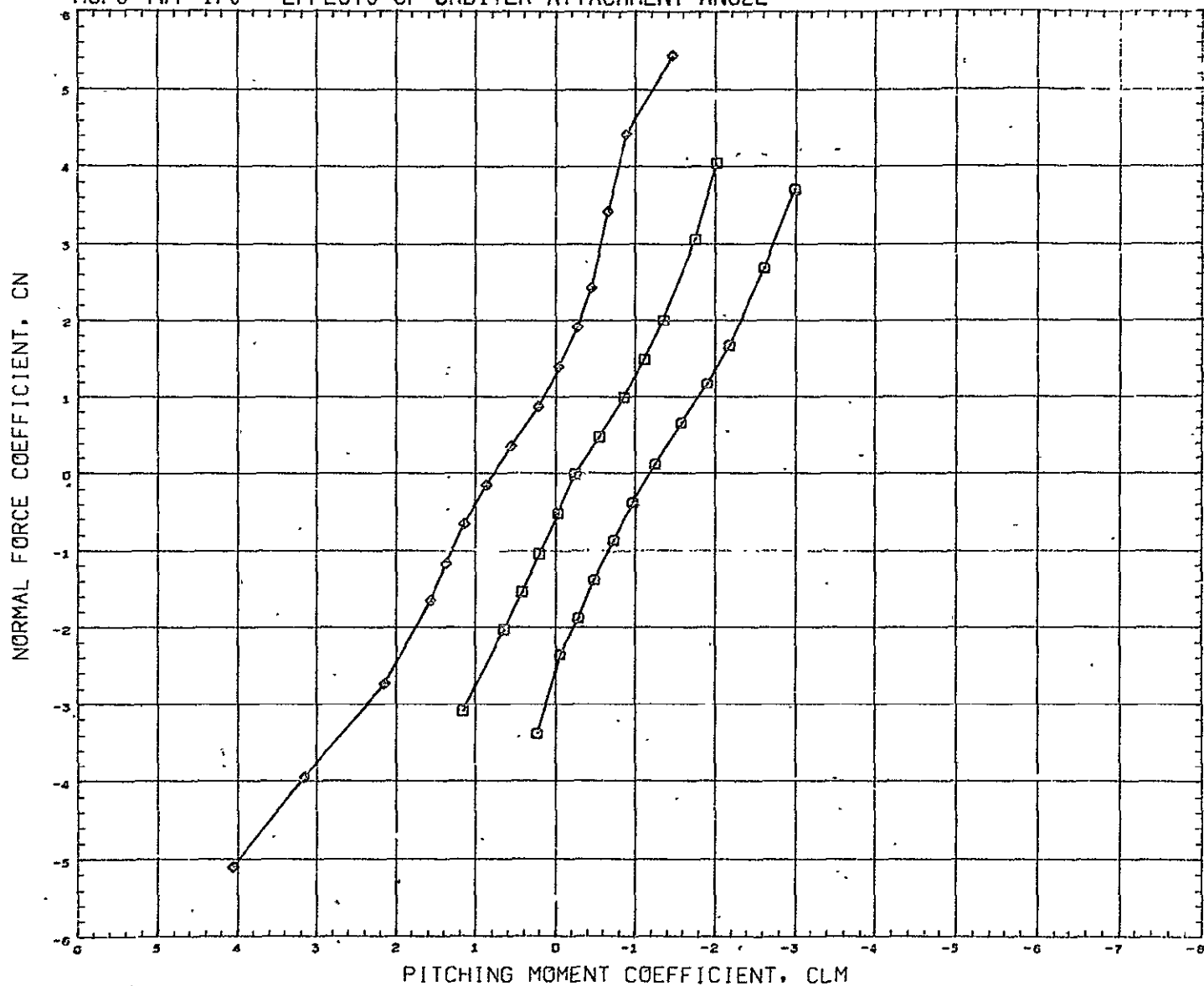
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(A24041) 26 JAN 71

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MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE



SYMBOL	ORBITER	PARAMETRIC VALUES			
○	4.000	MACH	1.458	BETA	0.050
□	2.000	WING INC	4.000	HTAIL	0.000
◇	0.000	PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

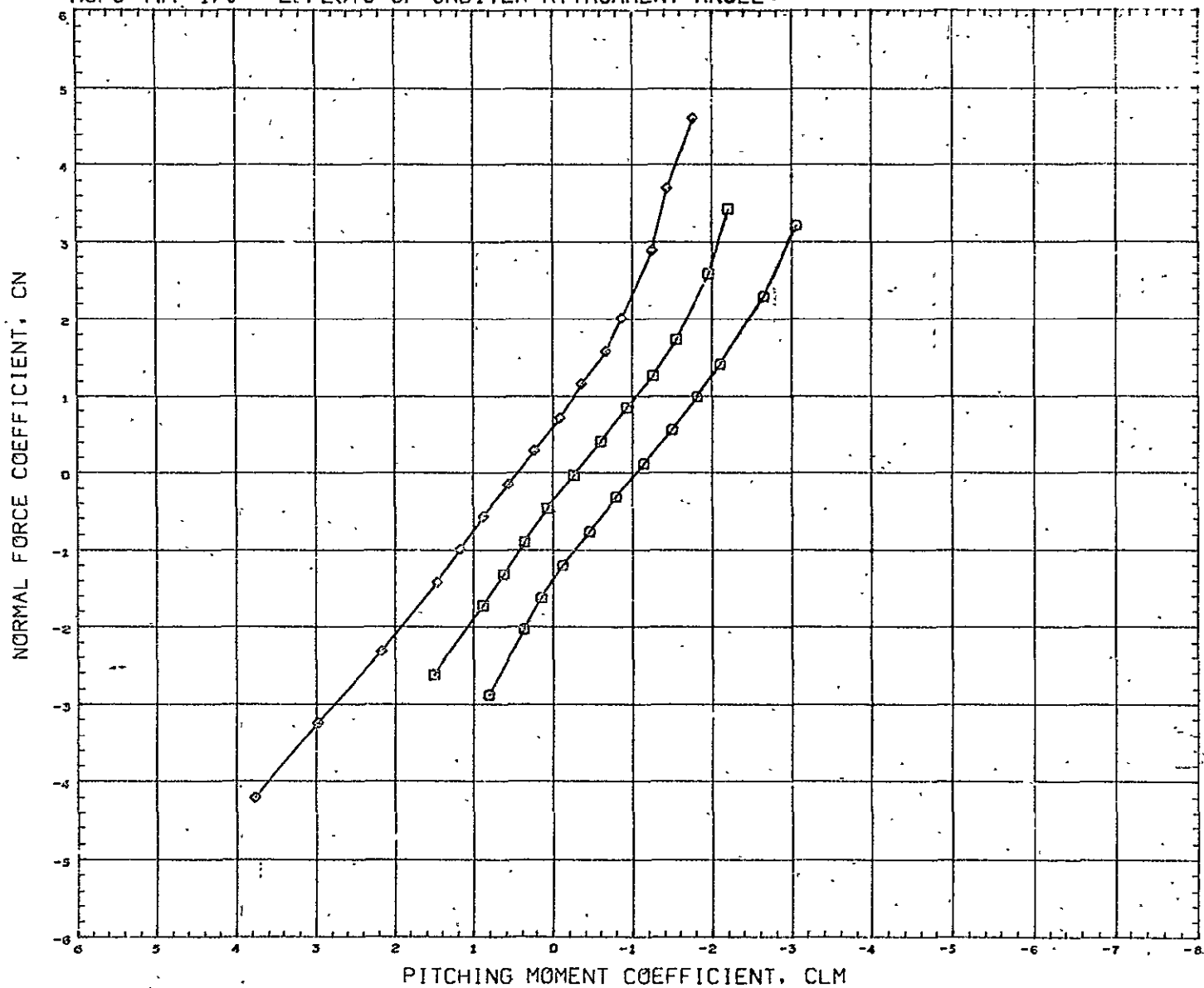
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TWT470 S-IC/GAC ORBITER BF10WHVS FINS ON

(A24041) 26 JAN 71

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MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

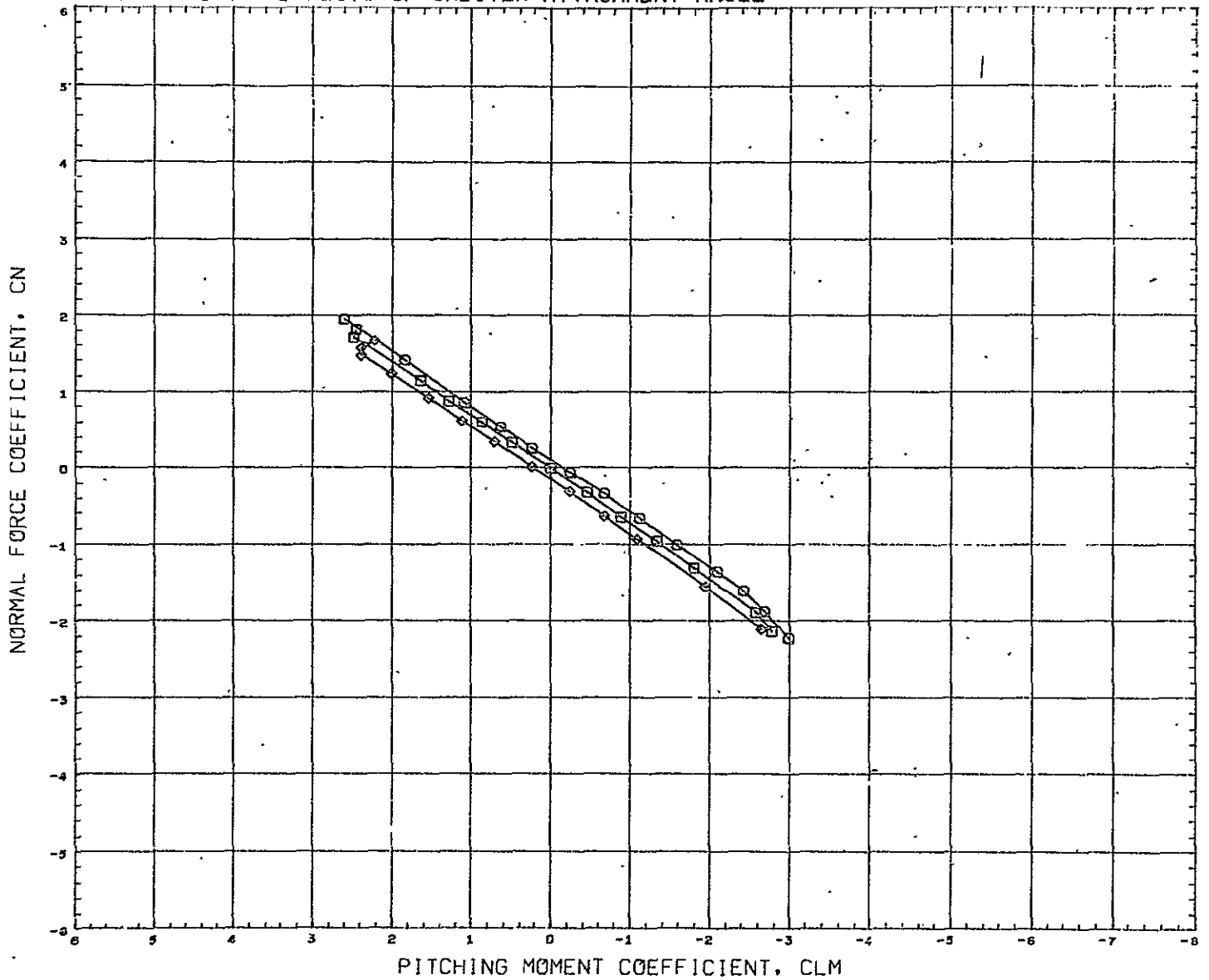


SYMBOL		ORBINC		PARAMETRIC VALUES			
○	-	4.000	HACH	1.950	BETA	-	0.050
□	-	2.000	WINGINC	4.000	MTAIL		0.000
◇	-	0.000	PHIB	0.000			

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRF	5.2640	INCHES
YNRF	0.0000	INCHES
ZNRF	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

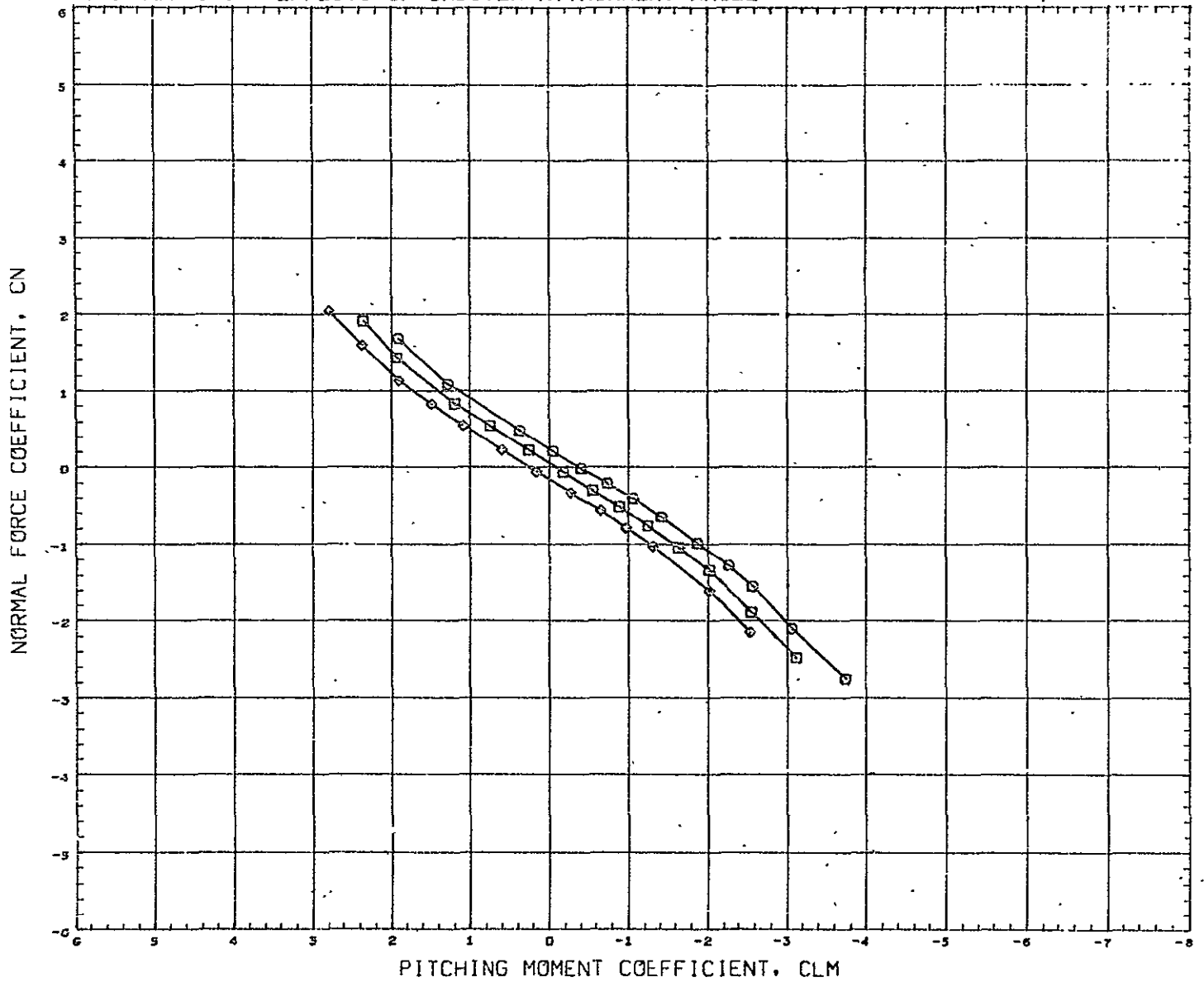


SYMBOL	ORBITER	PARAMETRIC VALUES			
○	4.000	MACH	0.599	BETA	- 0.040
□	2.000	WINGINC	4.000	HTAIL	0.000
◇	0.000	PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

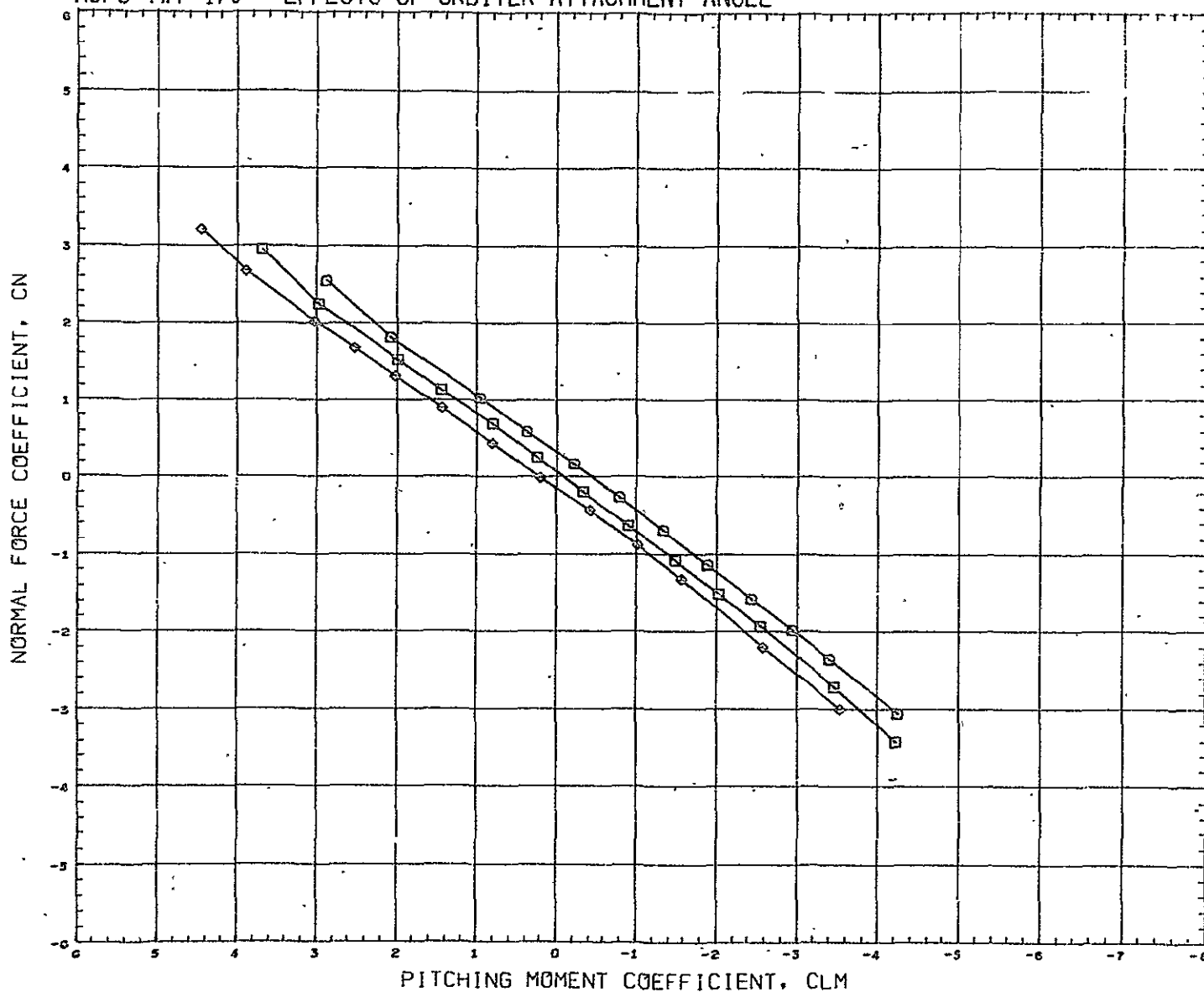


SYMBOL	ORBINC	PARAMETRIC VALUES			
◇	4.000	HACH	0.900	BETA	- 0.040
□	2.000	WNGINC	4.000	MTAIL	0.000
○	0.000	PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

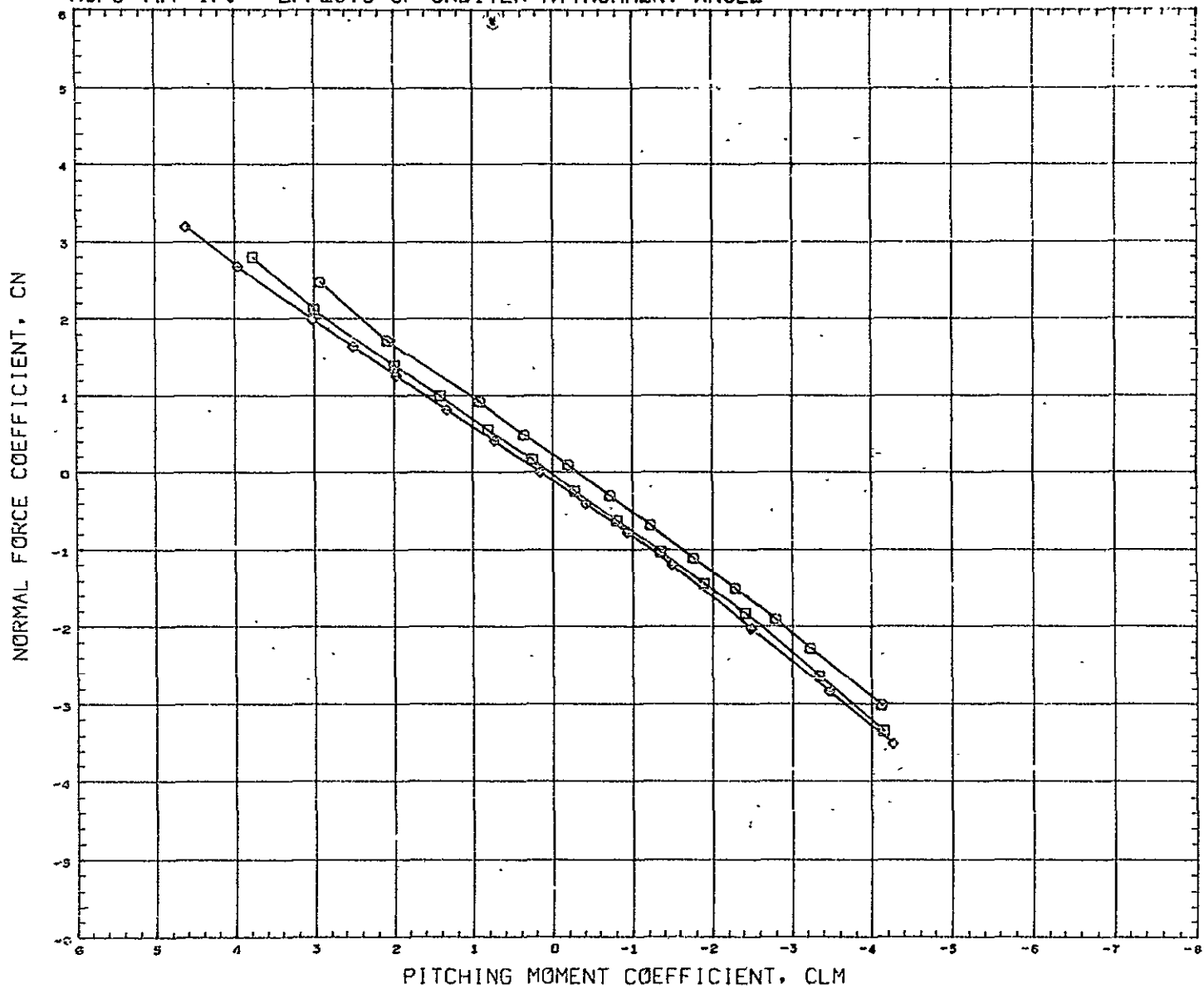


SYMBOL	ORBITER	PARAMETRIC VALUES			
○	- 4.000	HACH	0.997	BETA	- 0.040
□	- 2.000	WNGINC	4.000	HTAIL	0.000
◇	0.000	PHIB	0.000		

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

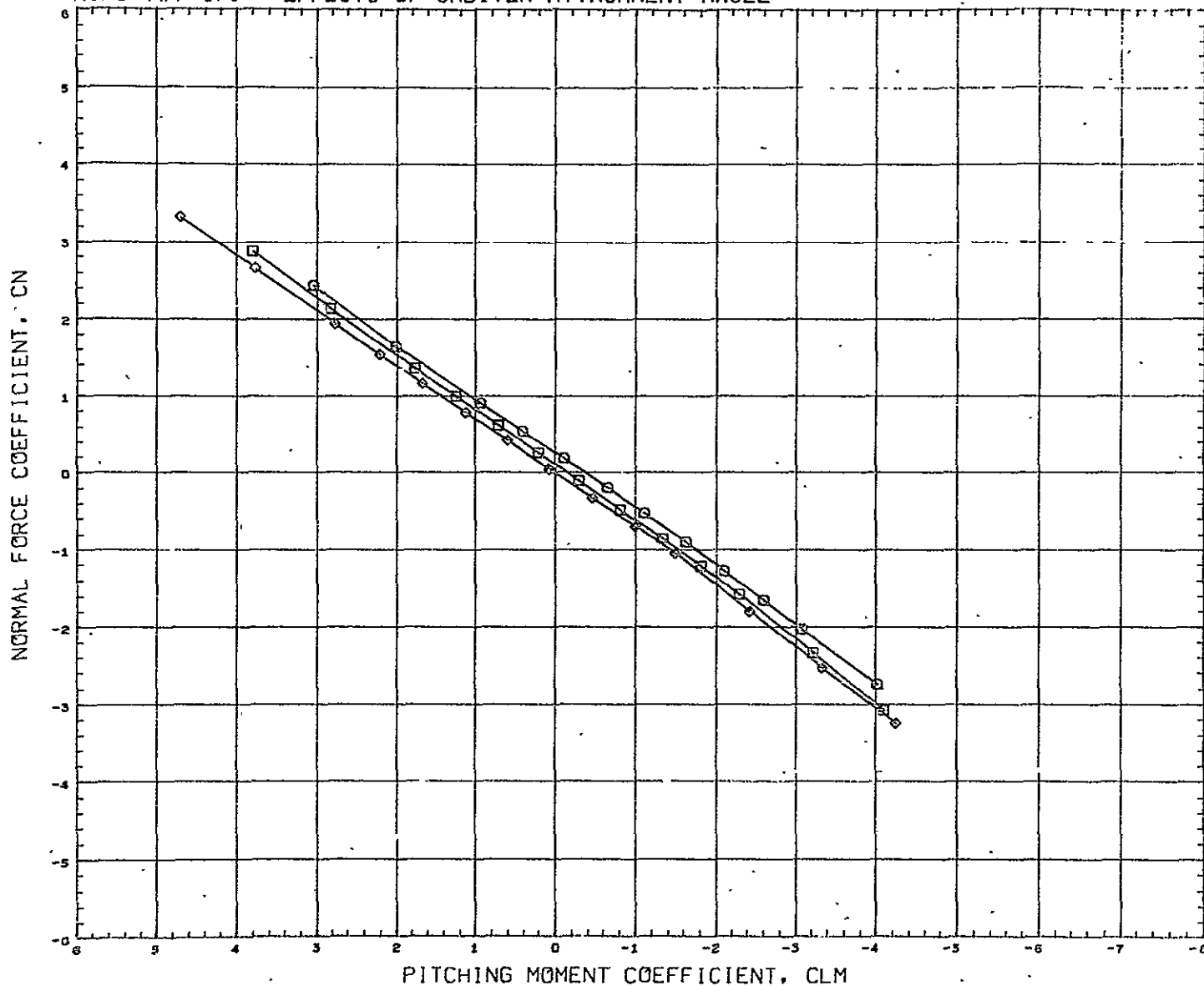


SYMBOL	ORGINC	PARAMETRIC VALUES			
◇	- 4.000	HACH	1.100	BETA	- 0.040
□	- 2.000	WNGINC	4.000	HTAIL	0.000
◇	0.000	PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3350	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE



SYMBOL	ORBITOR	PARAMETRIC VALUES
○	4.000	MACH 1.199 BETA - 0.040
□	2.000	WINGINC 4.000 HTAIL 0.000
◇	0.000	PHIS 0.000

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

TWT470 S-IC/GAC ORBITER BOWHVS

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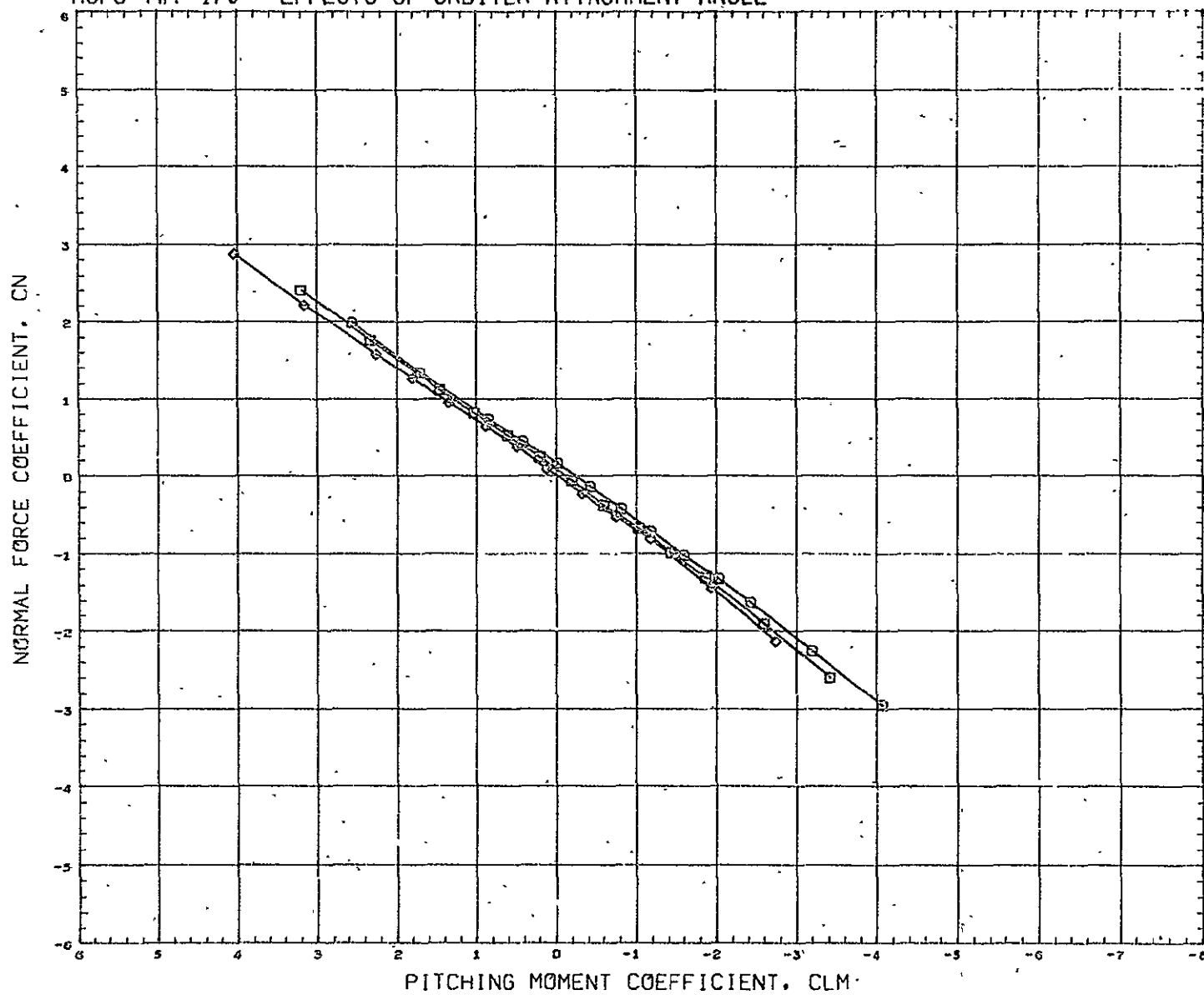
(A24071)

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MSFC TWT 470 EFFECTS OF ORBITER ATTACHMENT ANGLE

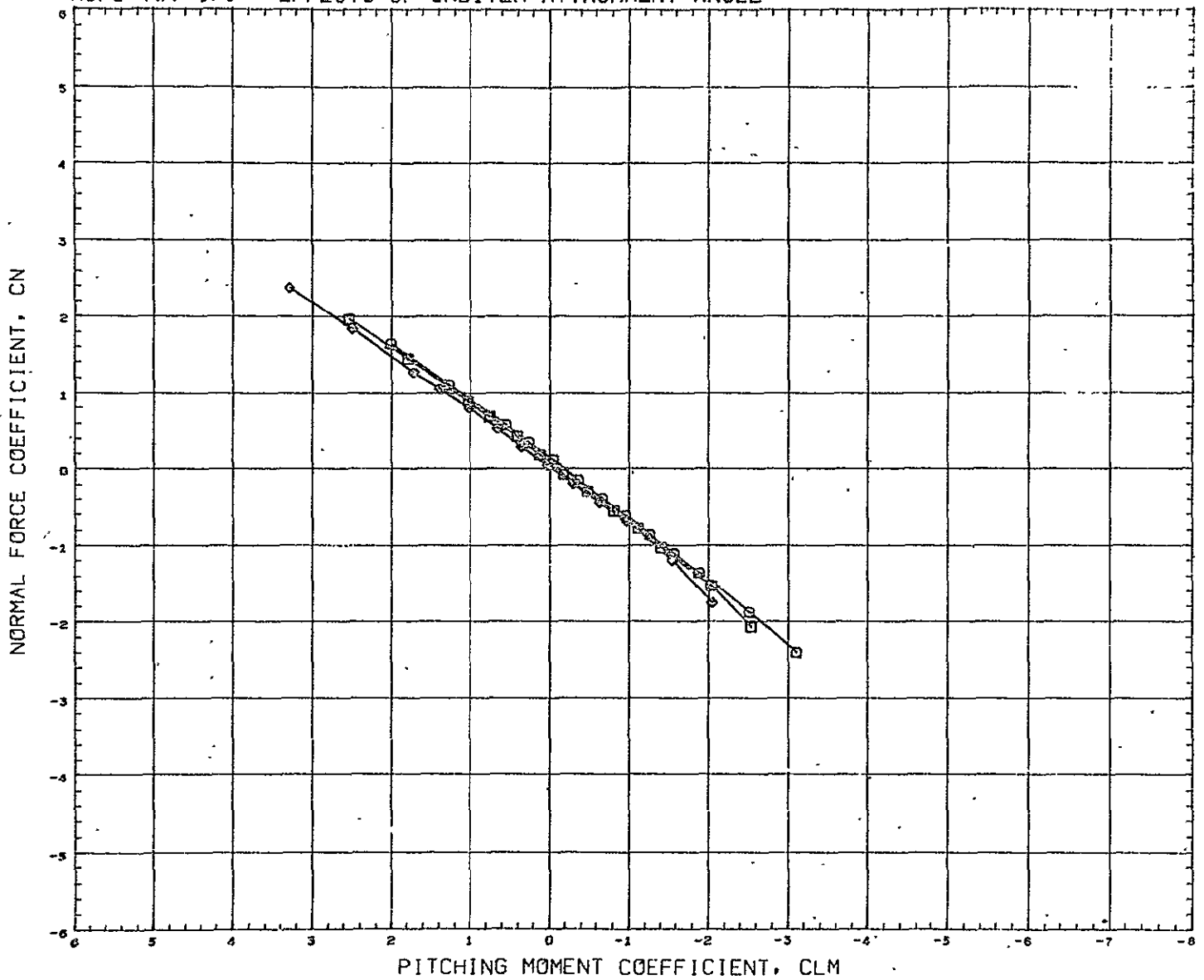


SYMBOL	ORBITER	PARAMETRIC VALUES
○	4.000	HACH 1.460 BETA - 0.040
□	2.000	WINGINC 4.000 HTAIL 0.000
◇	0.000	PHIB 0.000

REFERENCE INFORMATION		
REFS	1.3960	50.1N.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE 1

MSFC TWT-470 EFFECTS OF ORBITER ATTACHMENT ANGLE

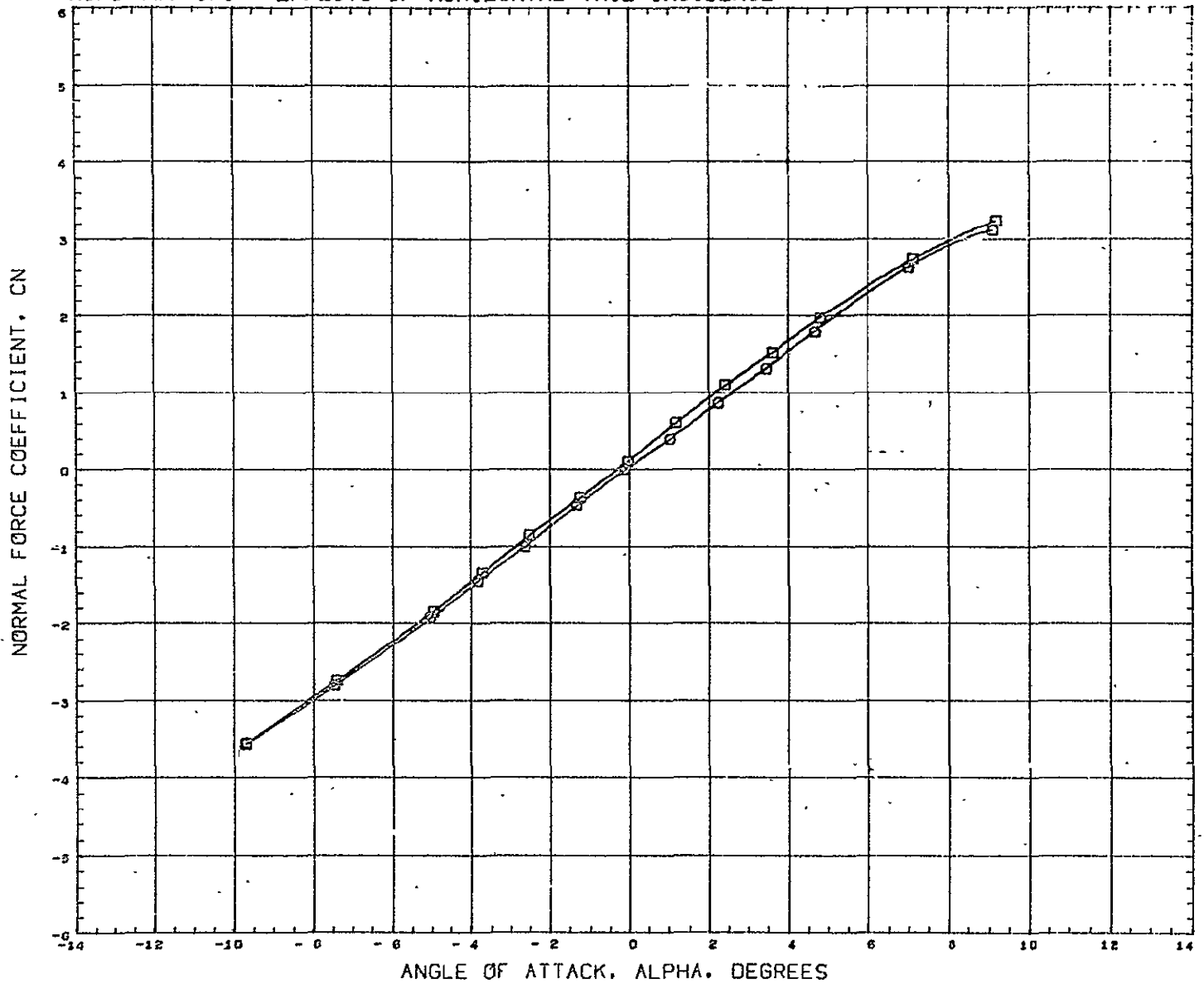


SYMBOL		ORBITER		PARAMETRIC VALUES			
○	-	4.000	MACH	1.952	BETA	-	0.080
□	-	2.000	WINGINC	4.000	MTAIL		0.000
◇		0.000	PHIB	0.000			

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE



SYMBOL	HTAIL	PARAMETRIC VALUES			
O	- 5.000	MACH	0.598	BETA	- 0.020
□	0.000	ORGINC	1.050	WNGINC	4.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	9.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

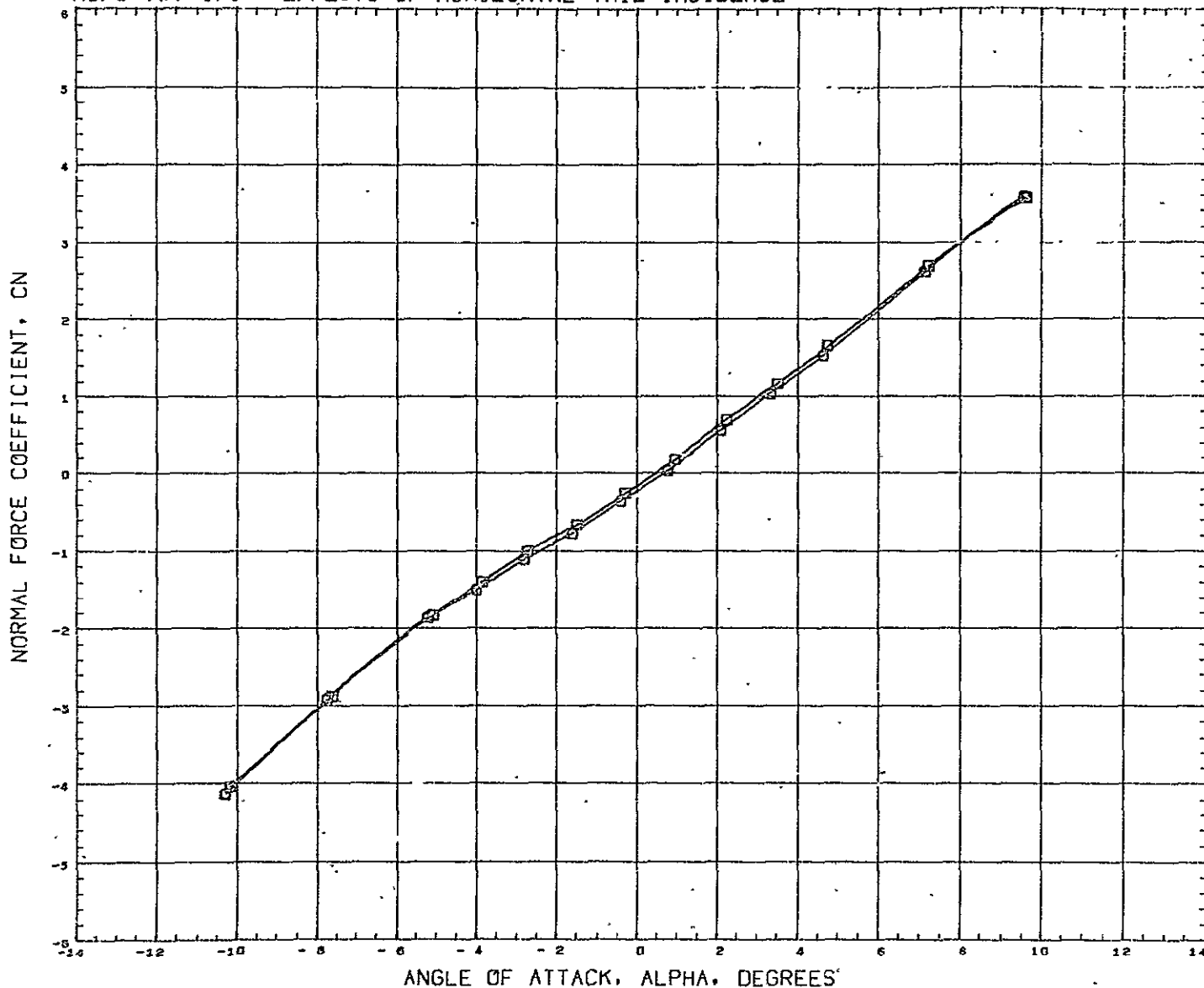
REFERENCE FILE

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MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE



SYMBOL	HTAIL	PARAMETRIC VALUES			
□	- 5.000	MACH	0.993	BETA	- 0.020
□	0.000	ORBINC	- 1.050	WNGINC	4.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

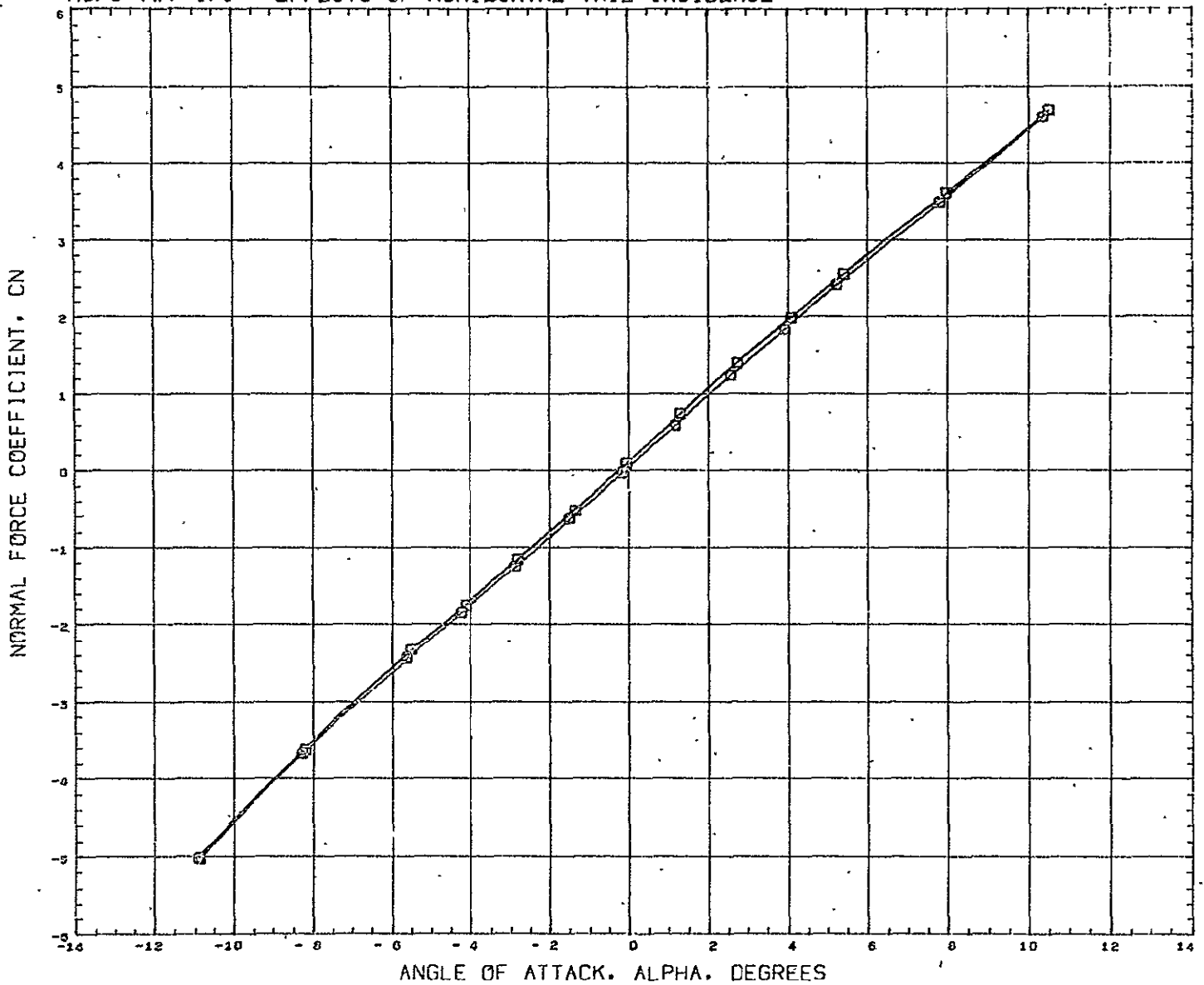
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TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

(A24091) 26 JAN 71

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MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE

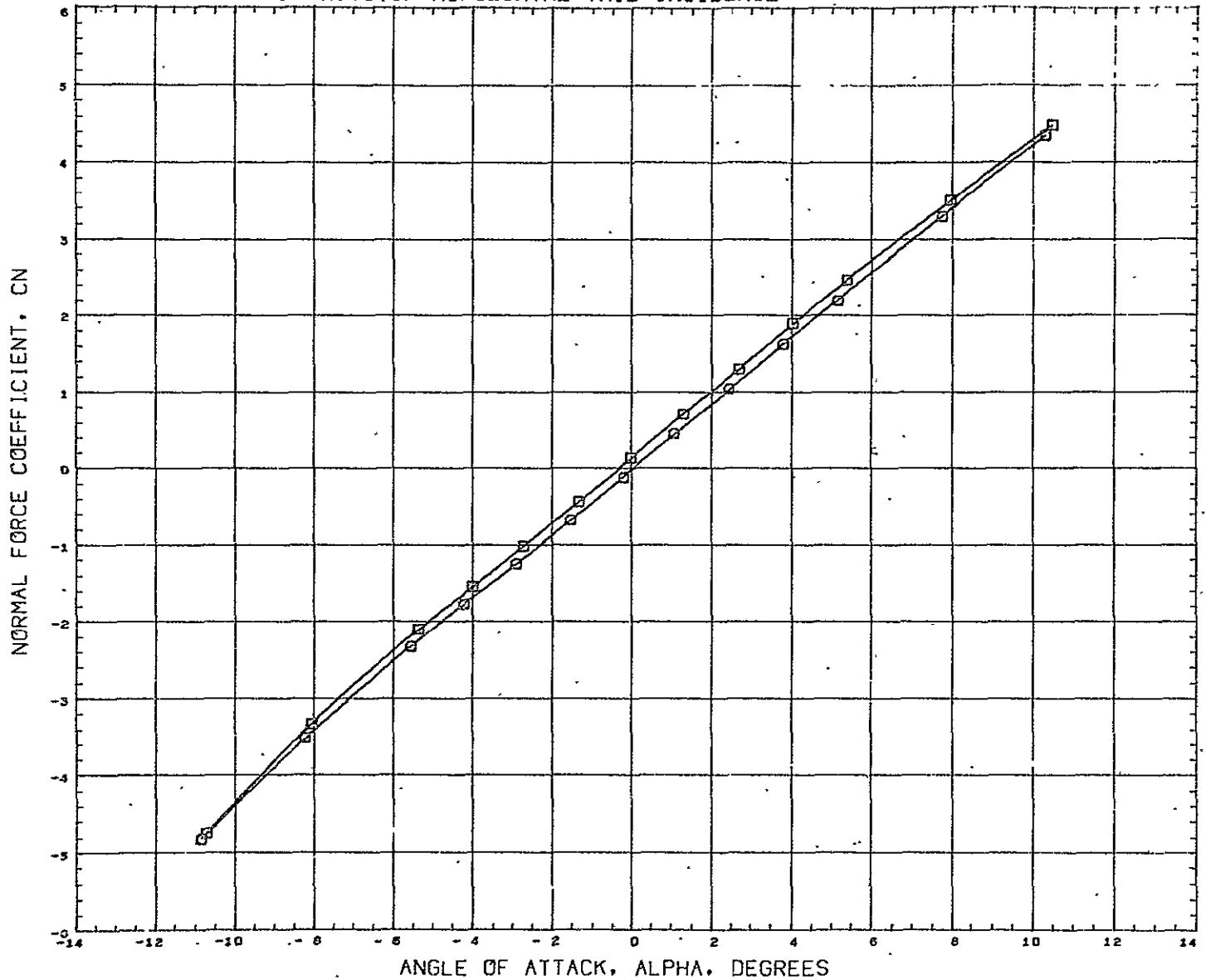


SYMBOL	HTAIL	PARAMETRIC VALUES			
O	5.000	MACH	0.995	BETA	-0.020
□	0.000	ORBINC	1.050	WNGINC	4.000
		PHIS	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE



SYMBOL	NTAIL	PARAMETRIC VALUES			
O	- 5.000	MACH	1.093	BETA	- 0.020
□	0.000	ORBINC	- 1.050	WHGINC	4.000
		PHIB	0.000		

REFERENCE FILE

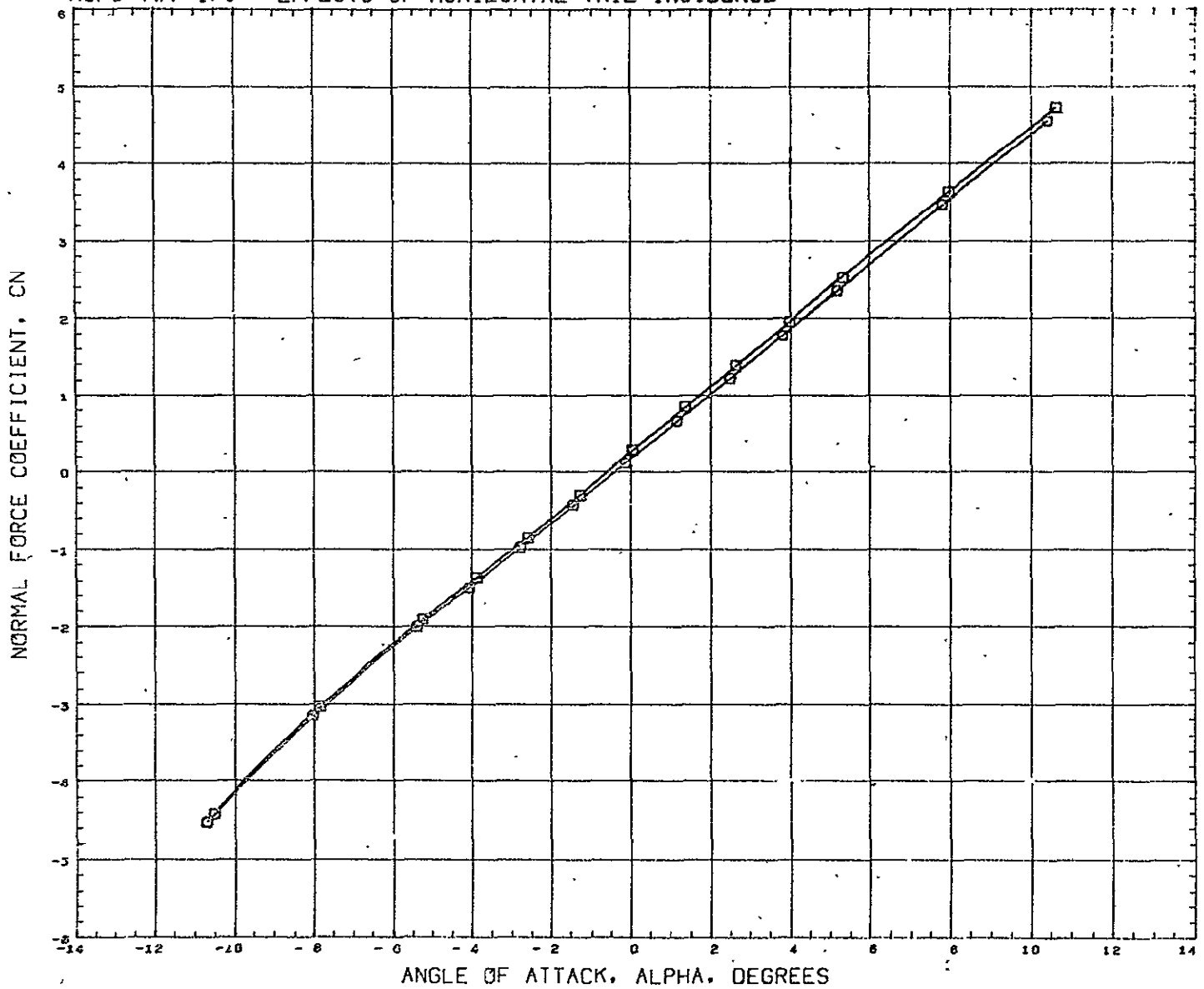
REFERENCE INFORMATION		
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REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

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MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE



SYMBOL	HTAIL	PARAMETRIC VALUES			
○	5.000	HACH	1.199	BETA	-0.020
□	0.000	ORBINC	-1.050	WNGINC	4.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRF	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

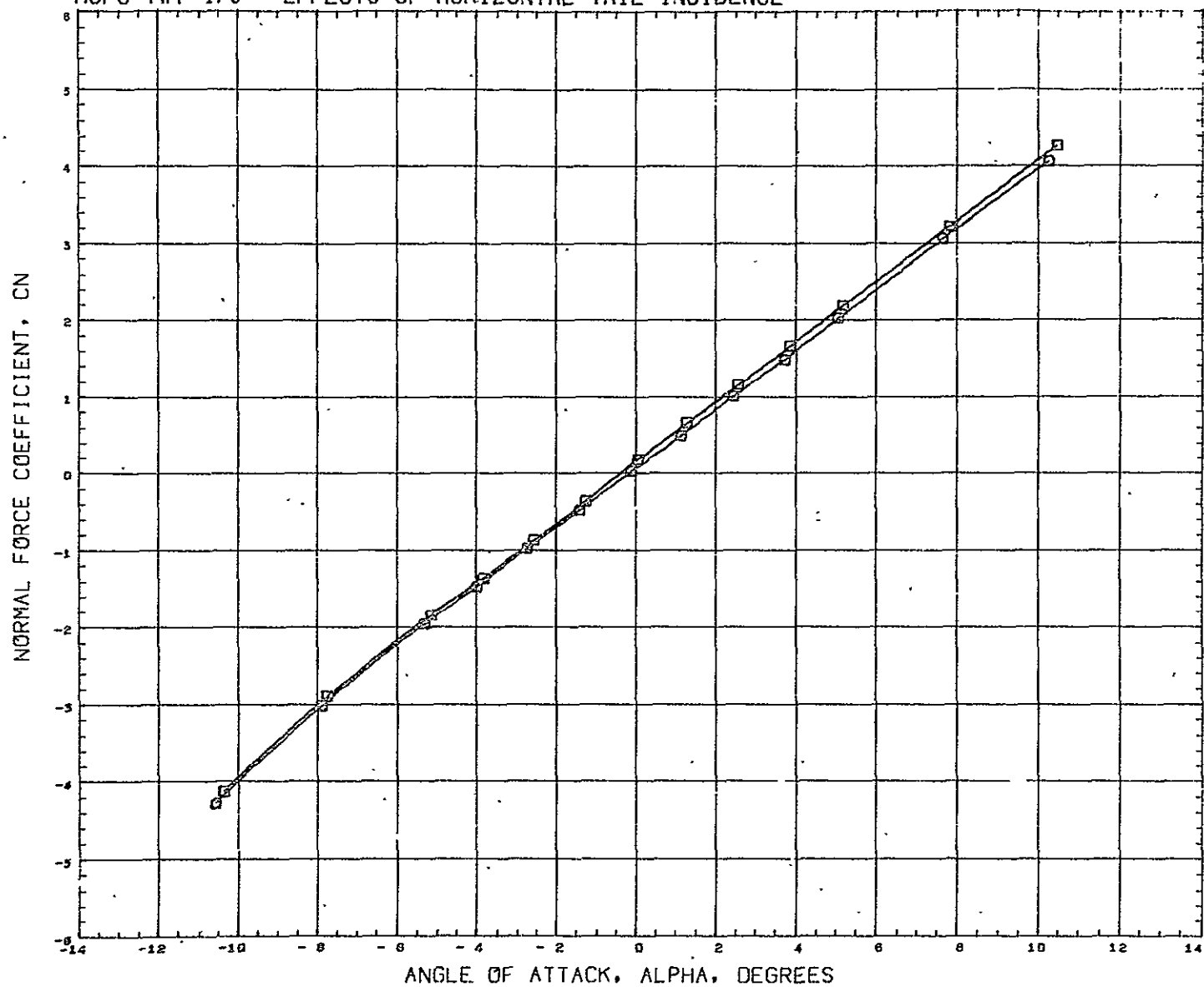
REFERENCE FILE

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE



SYMBOL	HTAIL	PARAMETRIC VALUES			
	□ - 5.000	MACH	1.454	BETA	- 0.020
	□ 0.000	ORBINC	- 1.050	MNGINC	4.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

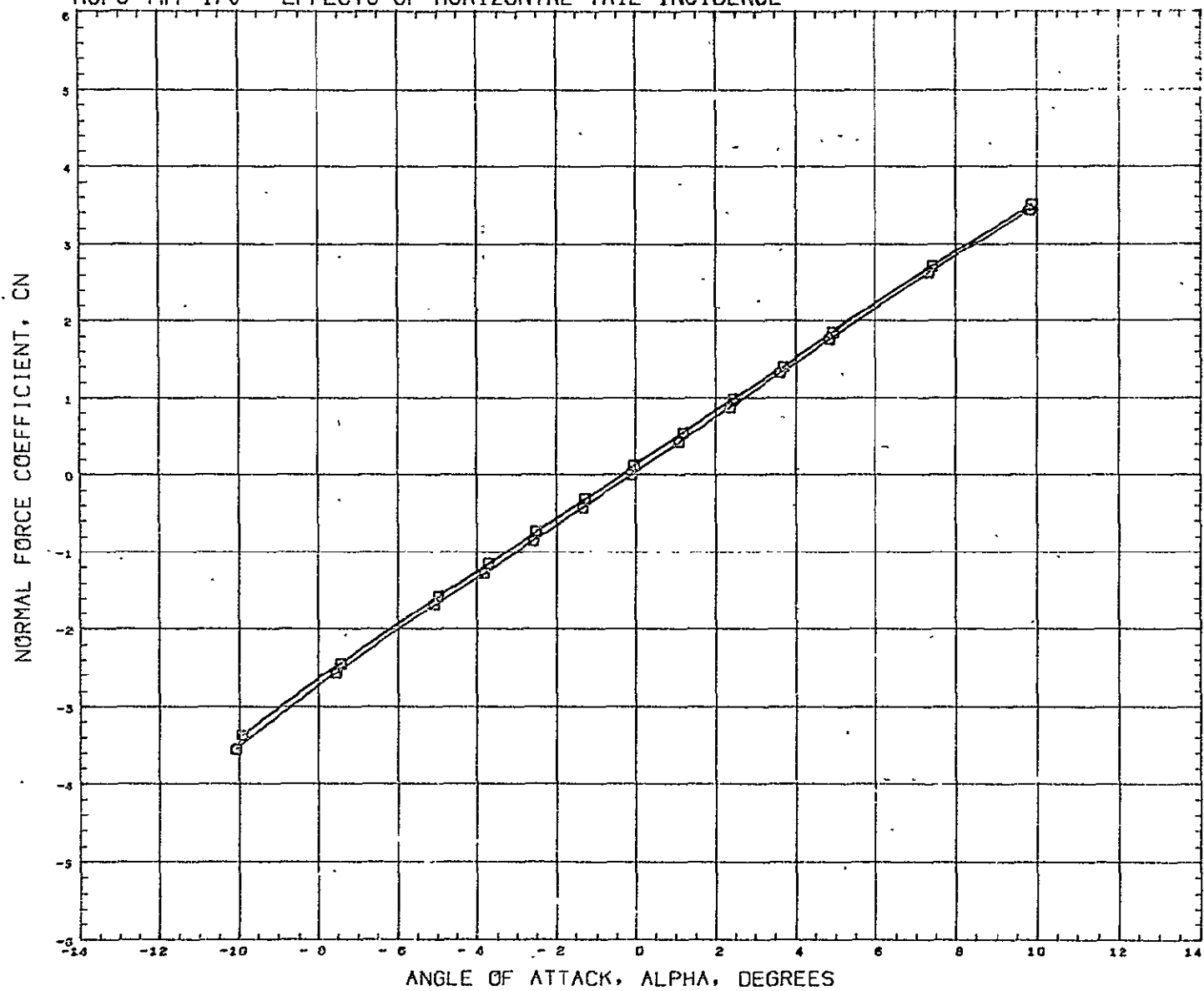
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MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE

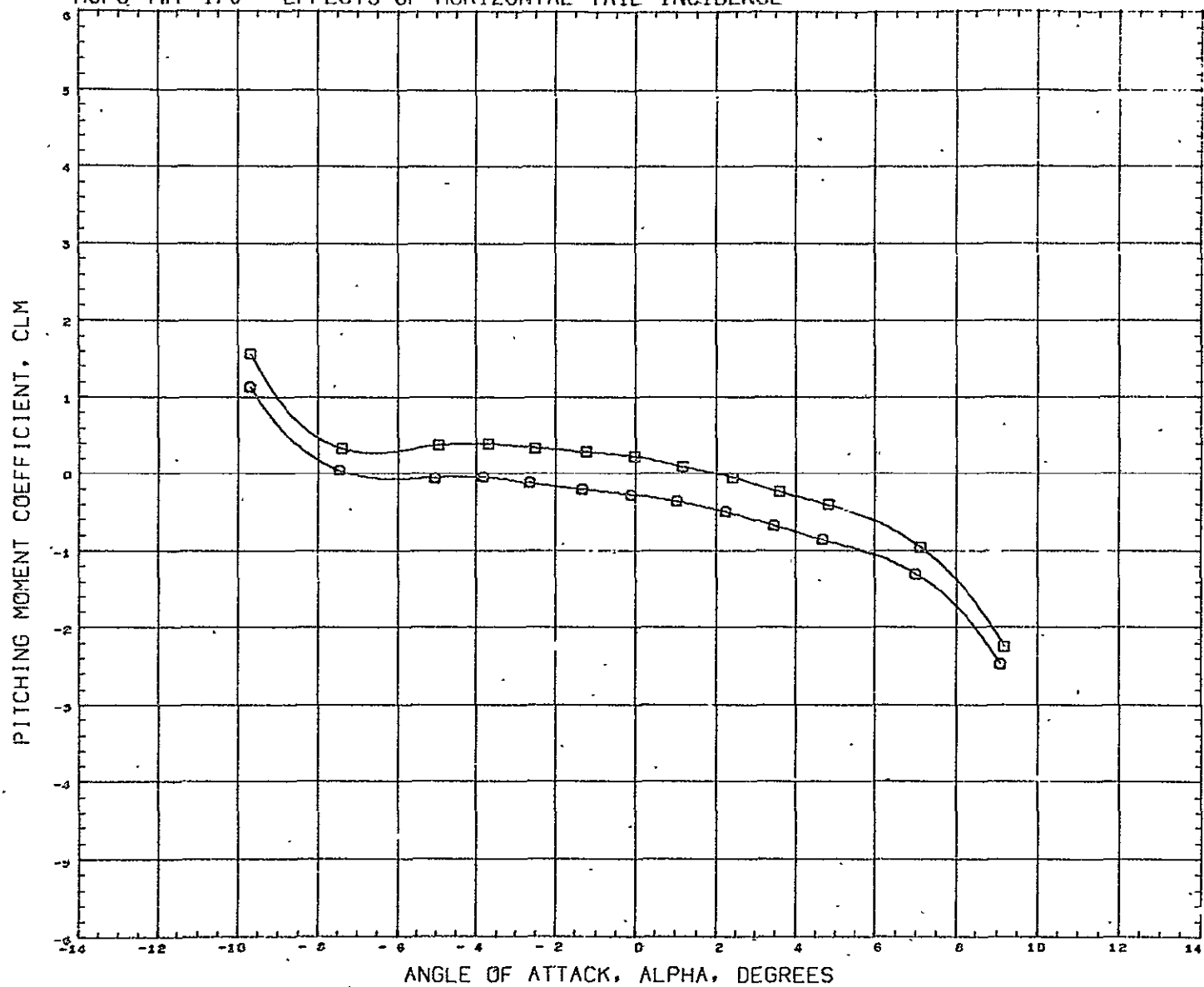


SYMBOL	HTAIL	PARAMETRIC VALUES			
O	5.000	HACH	1.981	BETA	0.020
□	0.000	ORINC	1.050	WNGINC	4.000
		PHIS	0.000		

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE

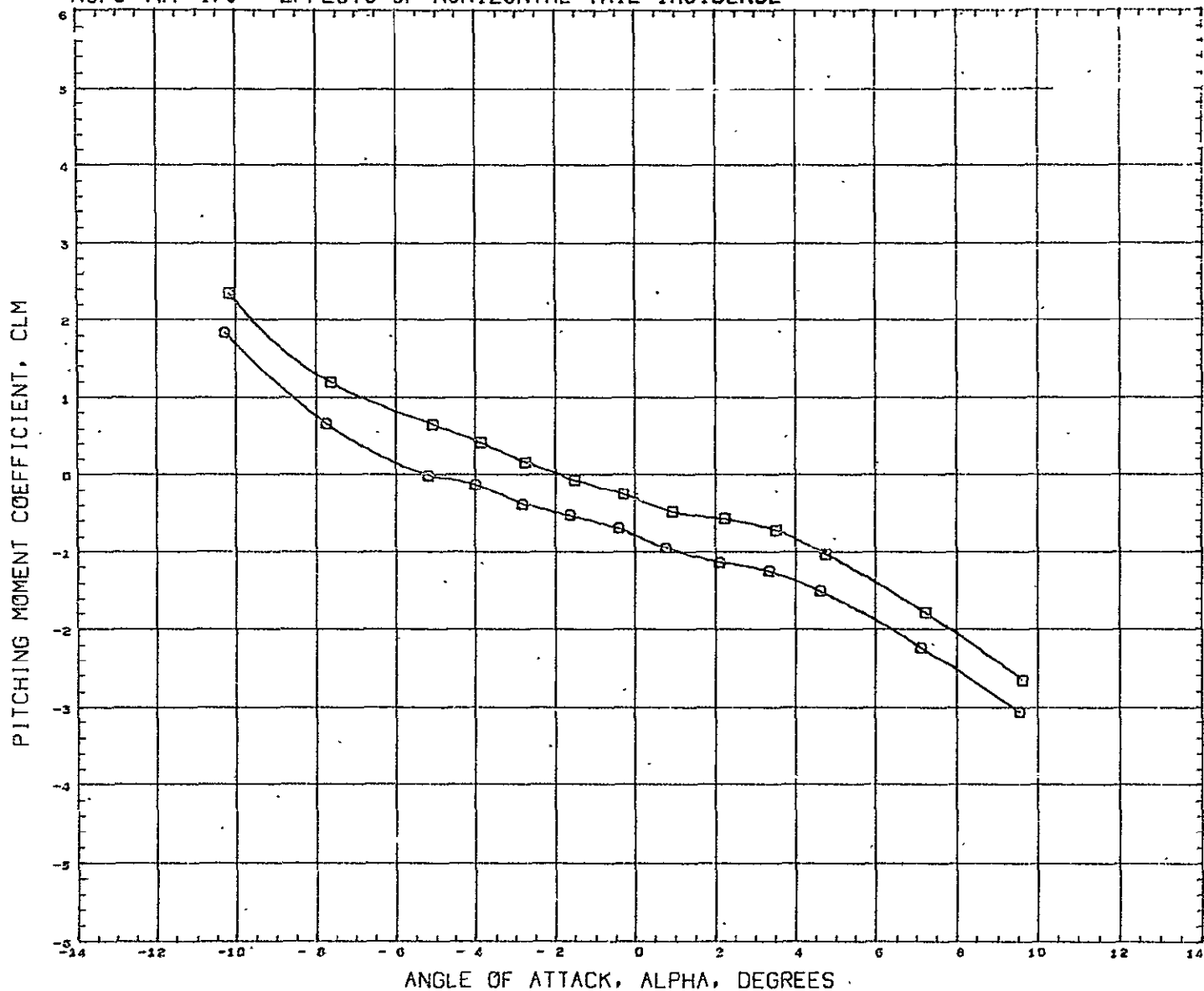


SYMBOL	HTAIL	PARAMETRIC VALUES			
○	5.000	NACH	0.598	BETA	- 0.020
□	0.000	ORBINC	- 1.050	MNGINC	4.000
		PHIB	0.000		

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	sq.in.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRF	5.2640	INCHES
YNRF	0.0000	INCHES
ZNRF	0.0000	INCHES
SCALE	0.3366	PERCNT

MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE

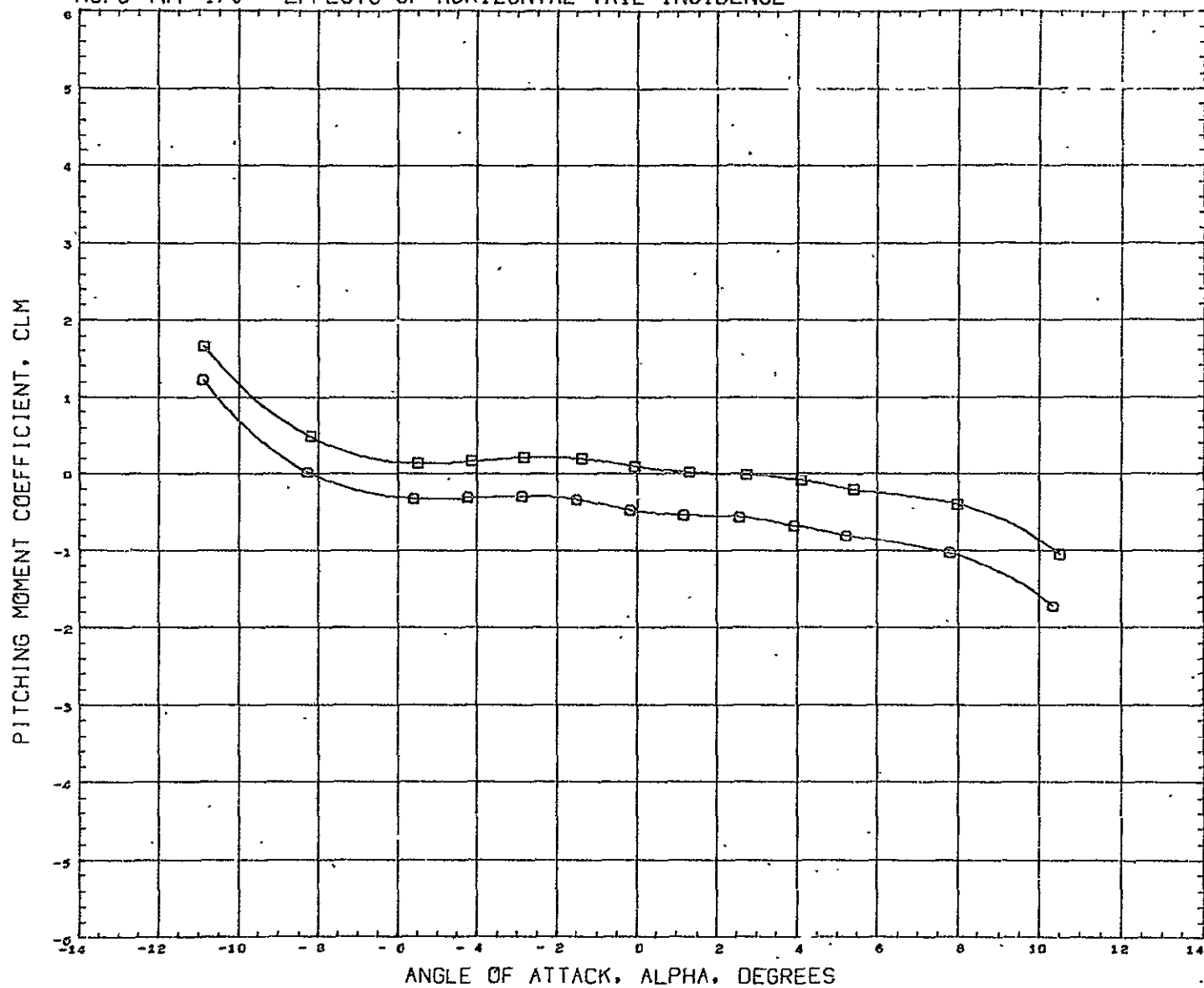


SYMBOL	HTAIL	PARAMETRIC VALUES			
○	5.000	HACH	0.893	BETA	- 0.020
□	0.000	ORBNIC	- 1.050	WNGINC	4.000
		PHIB	0.000		

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE



SYMBOL	HTAIL	PARAMETRIC VALUES			
○	- 5.000	NACH	0.995	BETA	- 0.020
□	0.000	ORINC	- 1.050	WNGINC	4.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

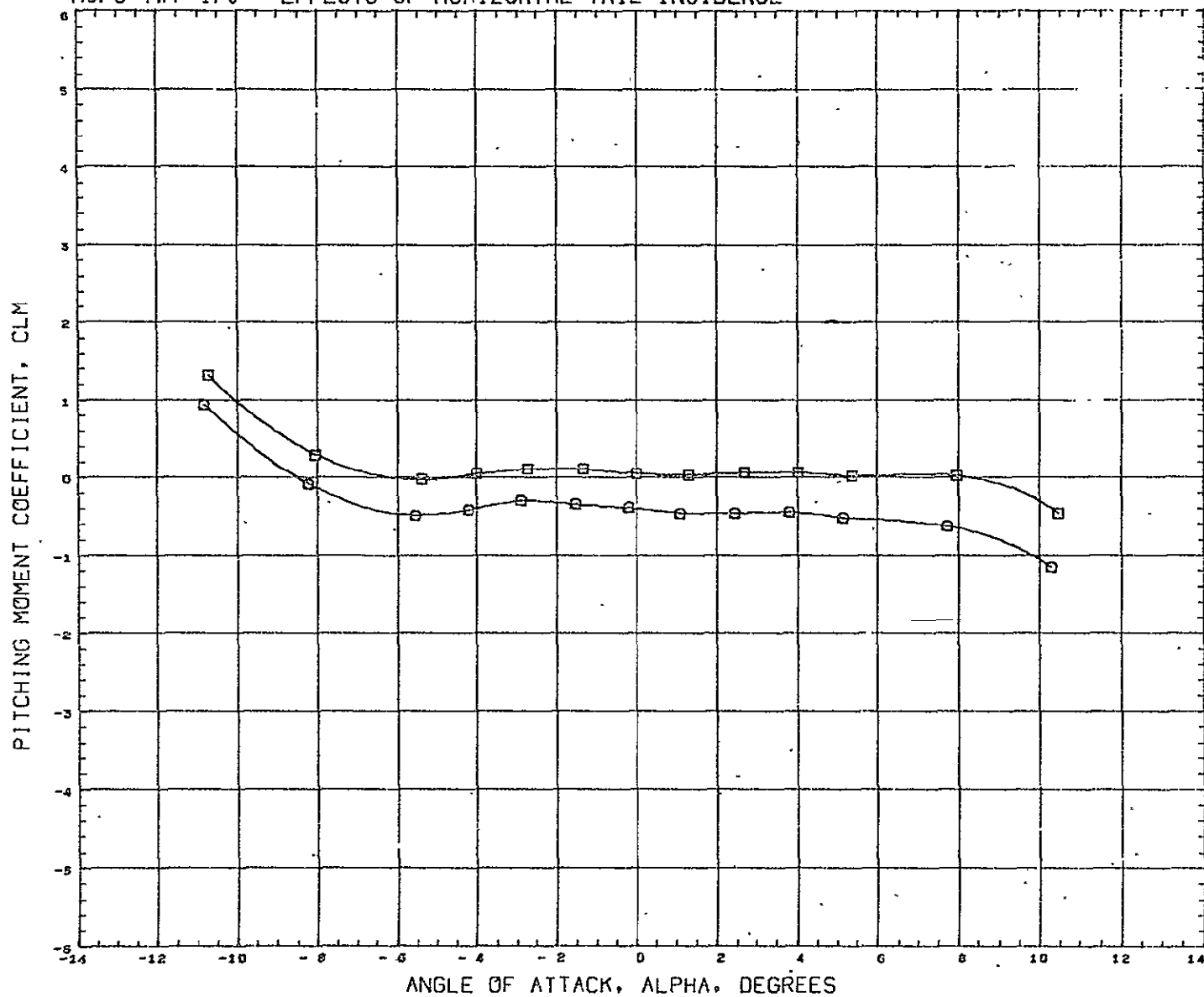
REFERENCE FILE

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MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE



SYMBOL	HTAIL	PARAMETRIC VALUES			
O	- 5.000	HACH	1.093	BETA	- 0.020
□	0.000	ORBIN	- 1.050	WGINC	4.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

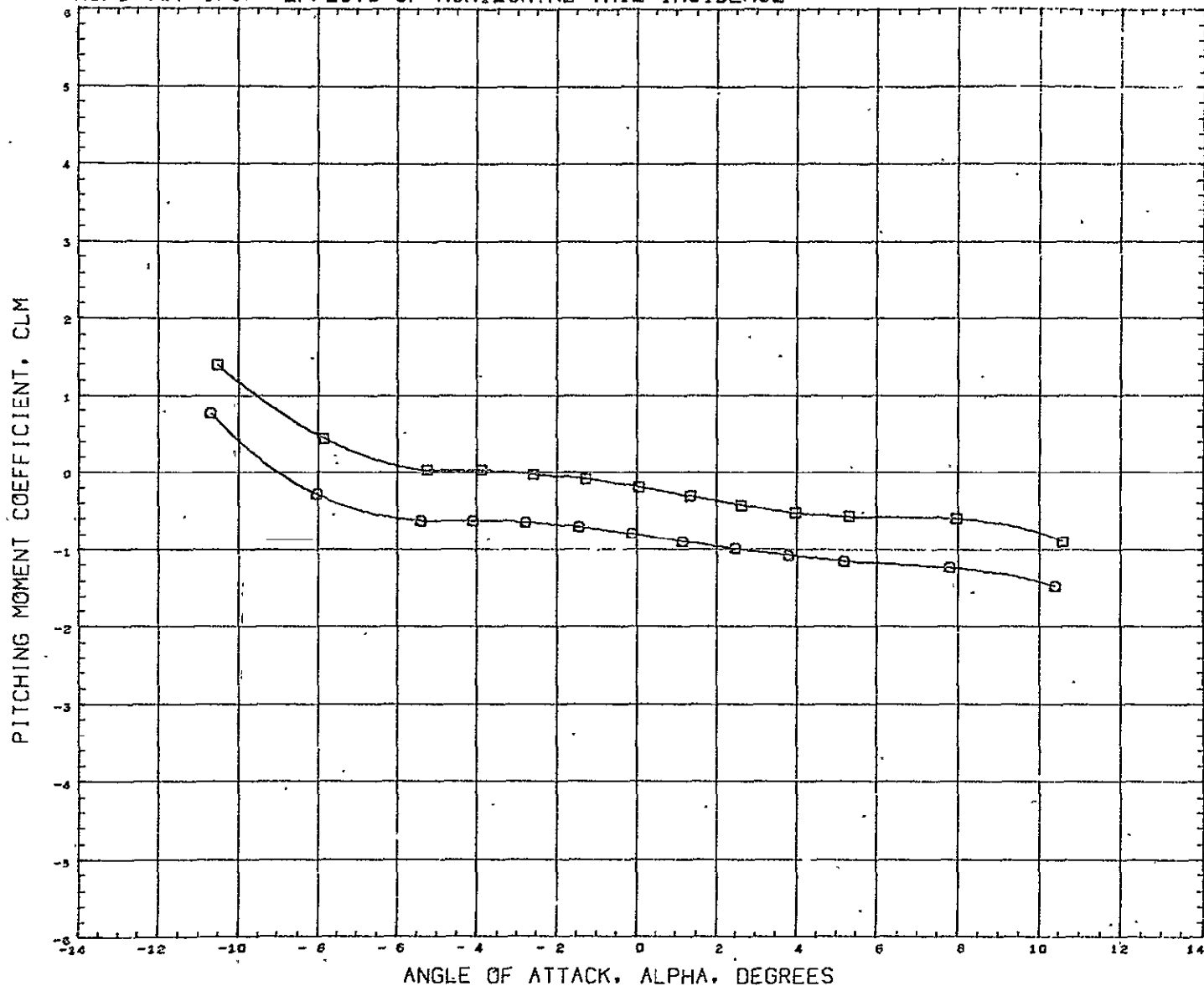
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TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470. EFFECTS OF HORIZONTAL TAIL INCIDENCE



SYMBOL	HTAIL	PARAMETRIC VALUES			
○	5.000	MACH	1.199	BETA	-0.020
□	0.000	ORBITINC	-1.050	WINGINC	4.000
		PHIB	0.000		

REFERENCE FILE

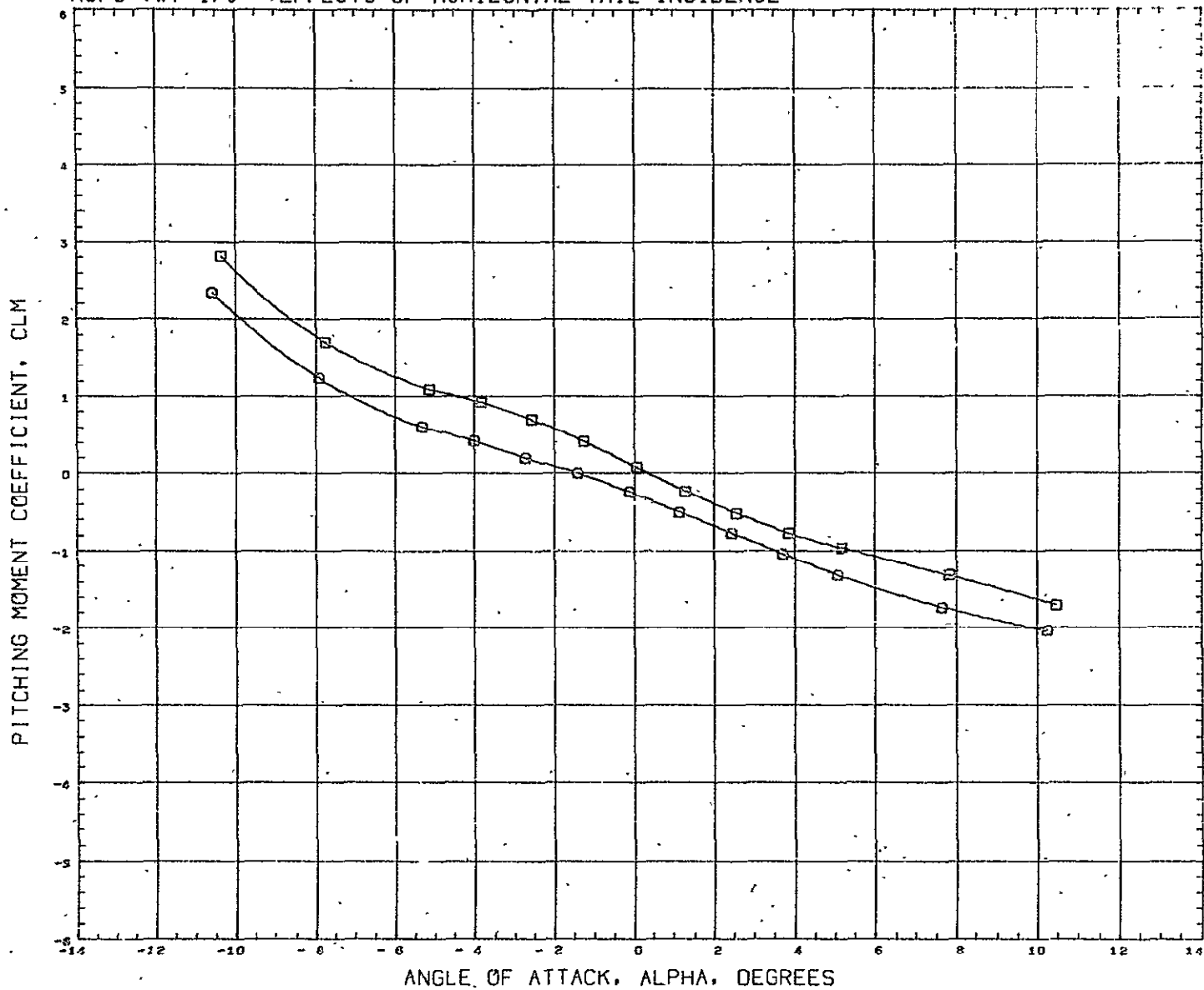
REFERENCE INFORMATION		
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REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

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MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE



SYMBOL		NTAIL		PARAMETRIC VALUES			
○	-	5.000		MACH	1.454	BETA	- 0.920
□	-	0.000		ORBINC	- 1.030	WHGINC	4.000
				PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	59.1 IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

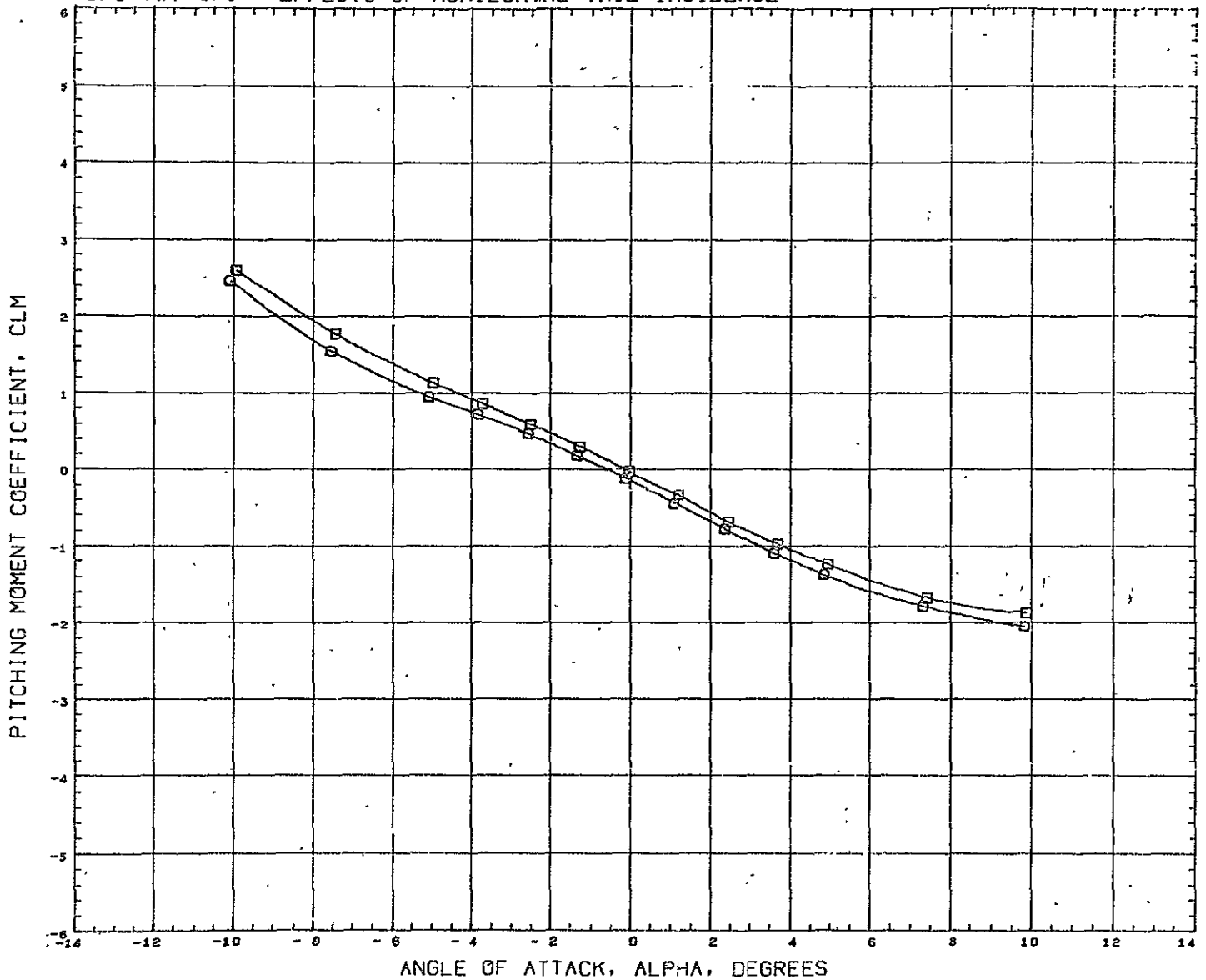
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MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE



SYMBOL	HTAIL	PARAMETRIC VALUES
○	5.000	NACH 1.961 BETA - 0.020
□	0.000	ORBNIC - 1.050 WNGINC 4.000
		PHIB 0.000

REFERENCE INFORMATION		
REFS	1.3960	50. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

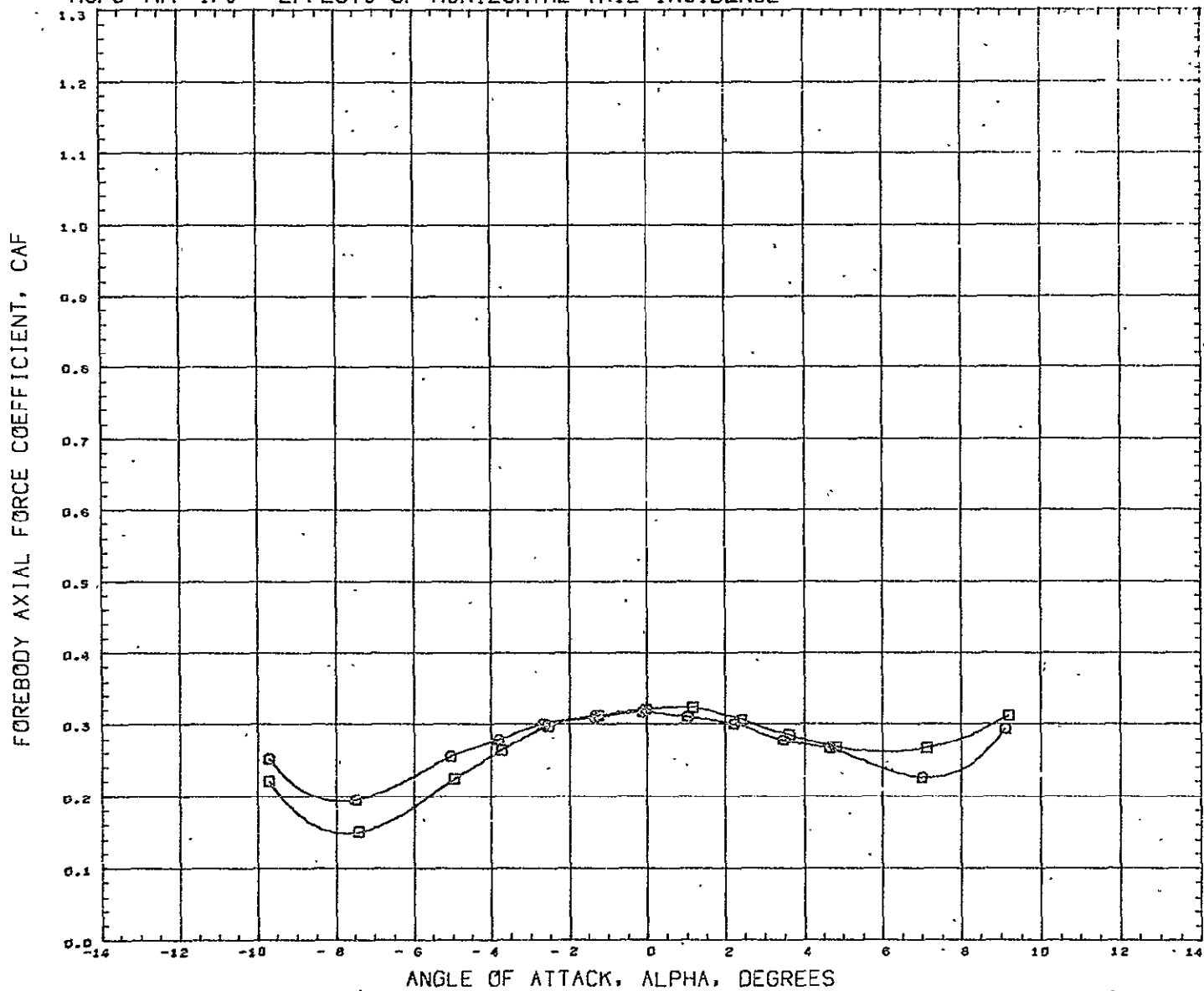
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MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE

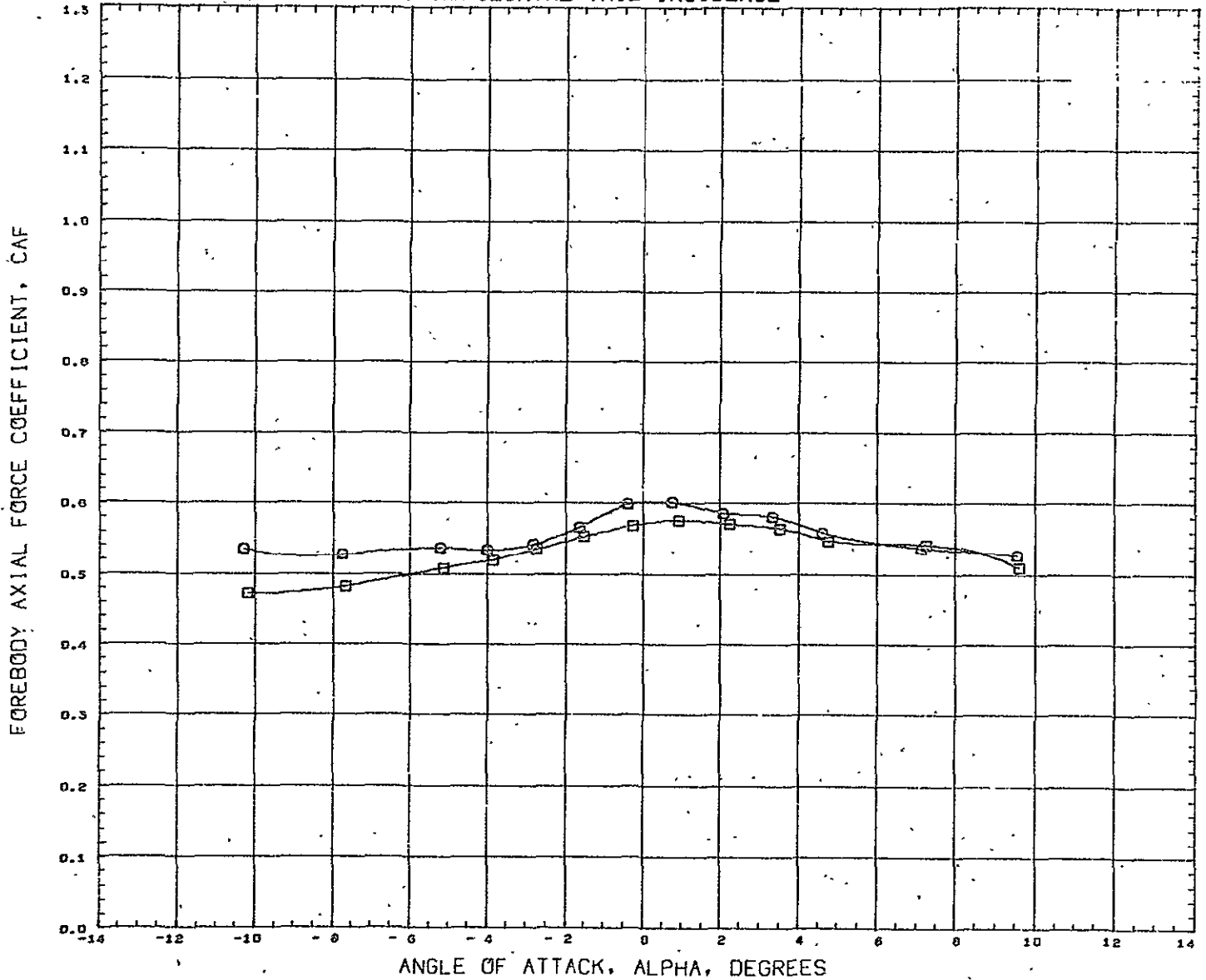


SYMBOL	HTAIL	PARAMETRIC VALUES			
○	5.000	HACH	0.598	BETA	0.020
□	0.000	ORGINC	1.050	UNGINC	4.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC TWT 470. EFFECTS OF HORIZONTAL TAIL INCIDENCE



SYMBOL	MTAIL	PARAMETRIC VALUES			
○	- 5.000	NACH	0.893	BETA	- 0.020
□	0.000	ORDINC	- 1.050	WNGINC	4.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	50. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

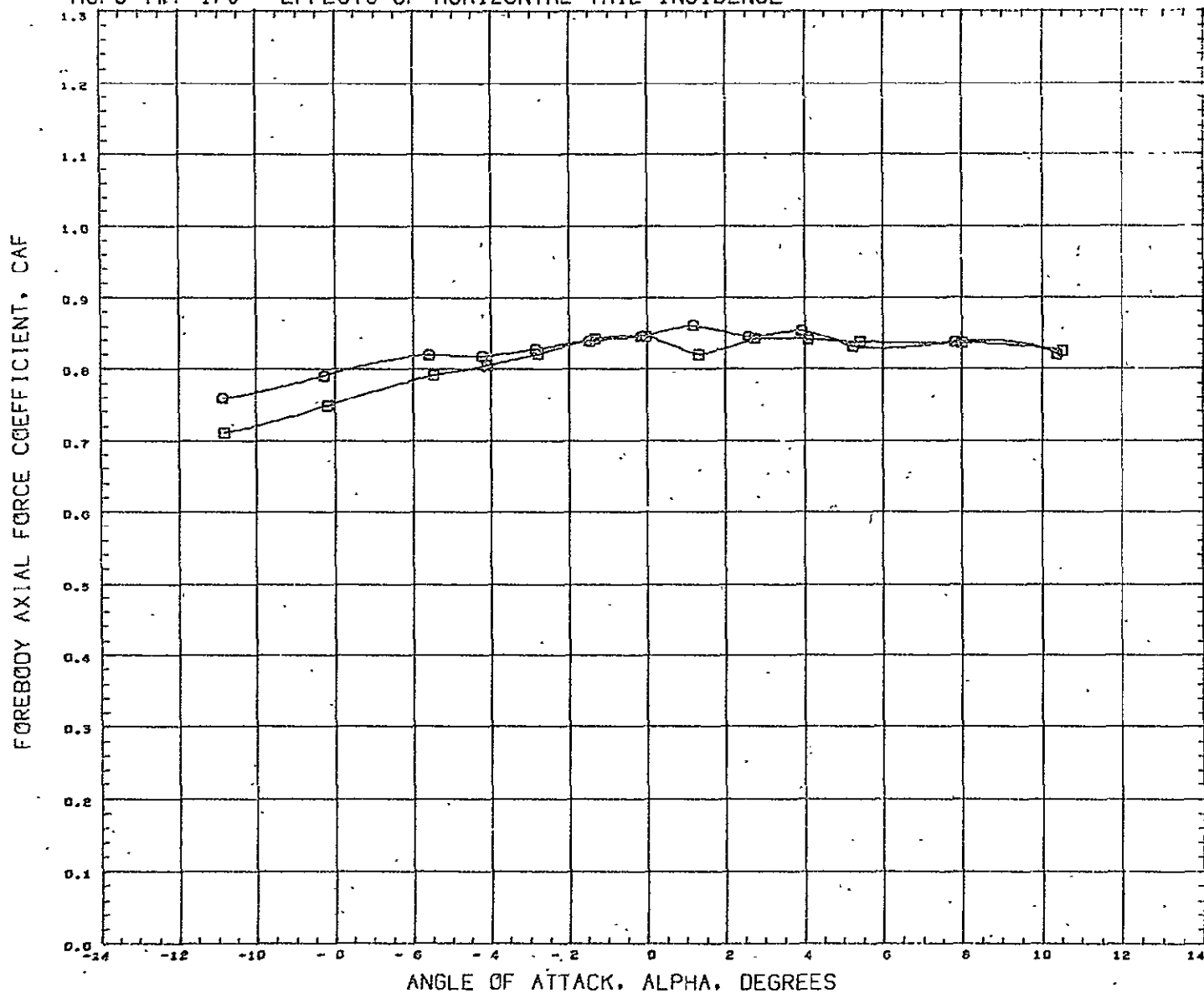
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TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE



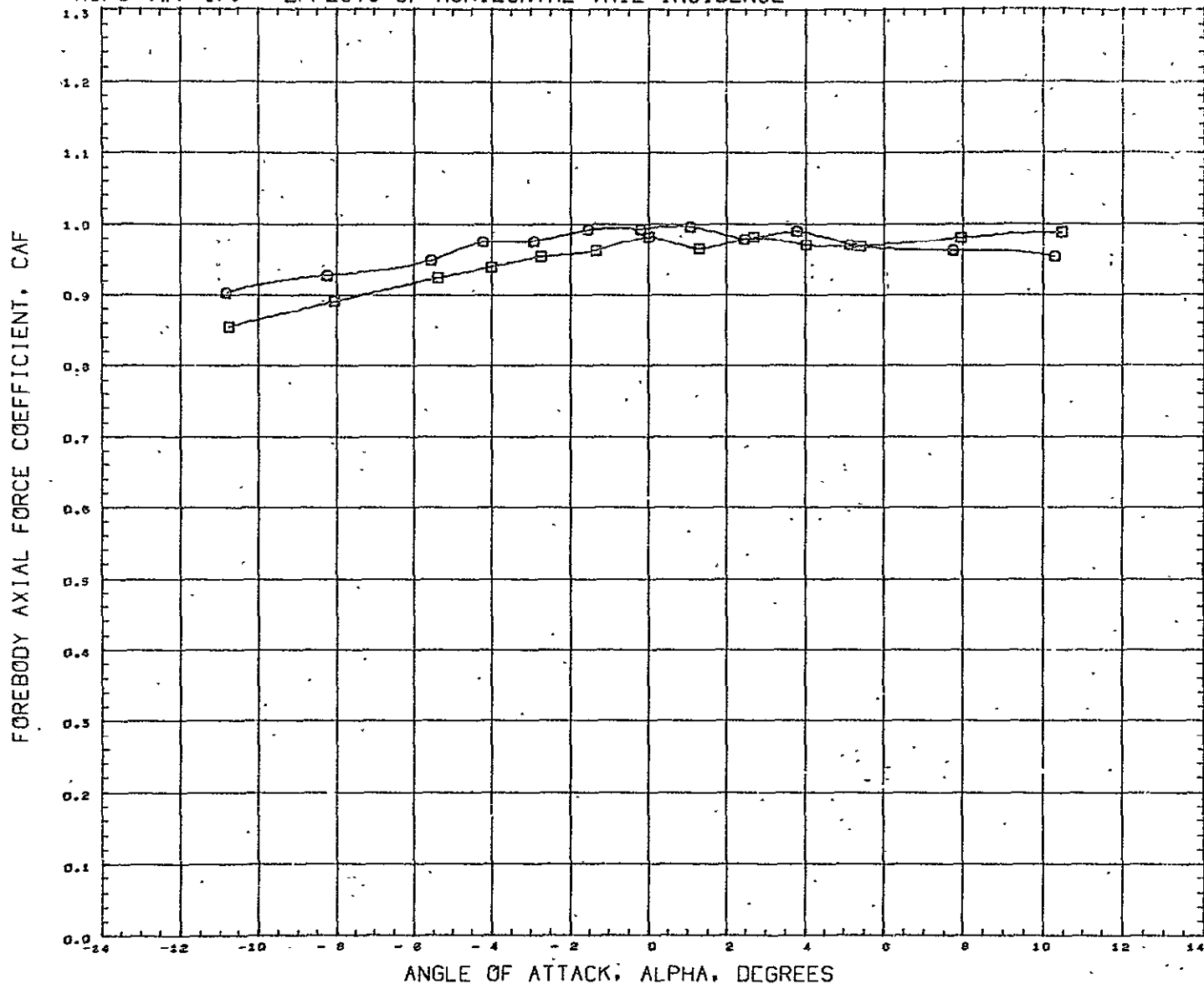
SYMBOL HTAIL
 O - 5.000
 □ 0.000

PARAMETRIC VALUES
 MACH 0.995 BETA - 0.020
 ORBINC 1.050 WNGINC 4.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE



SYMBOL	MTAIL	PARAMETRIC VALUES			
○	5.000	HACH	1.093	BETA	-0.020
□	0.000	ORBINC	1.050	WNGINC	4.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	60. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XHRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCNT

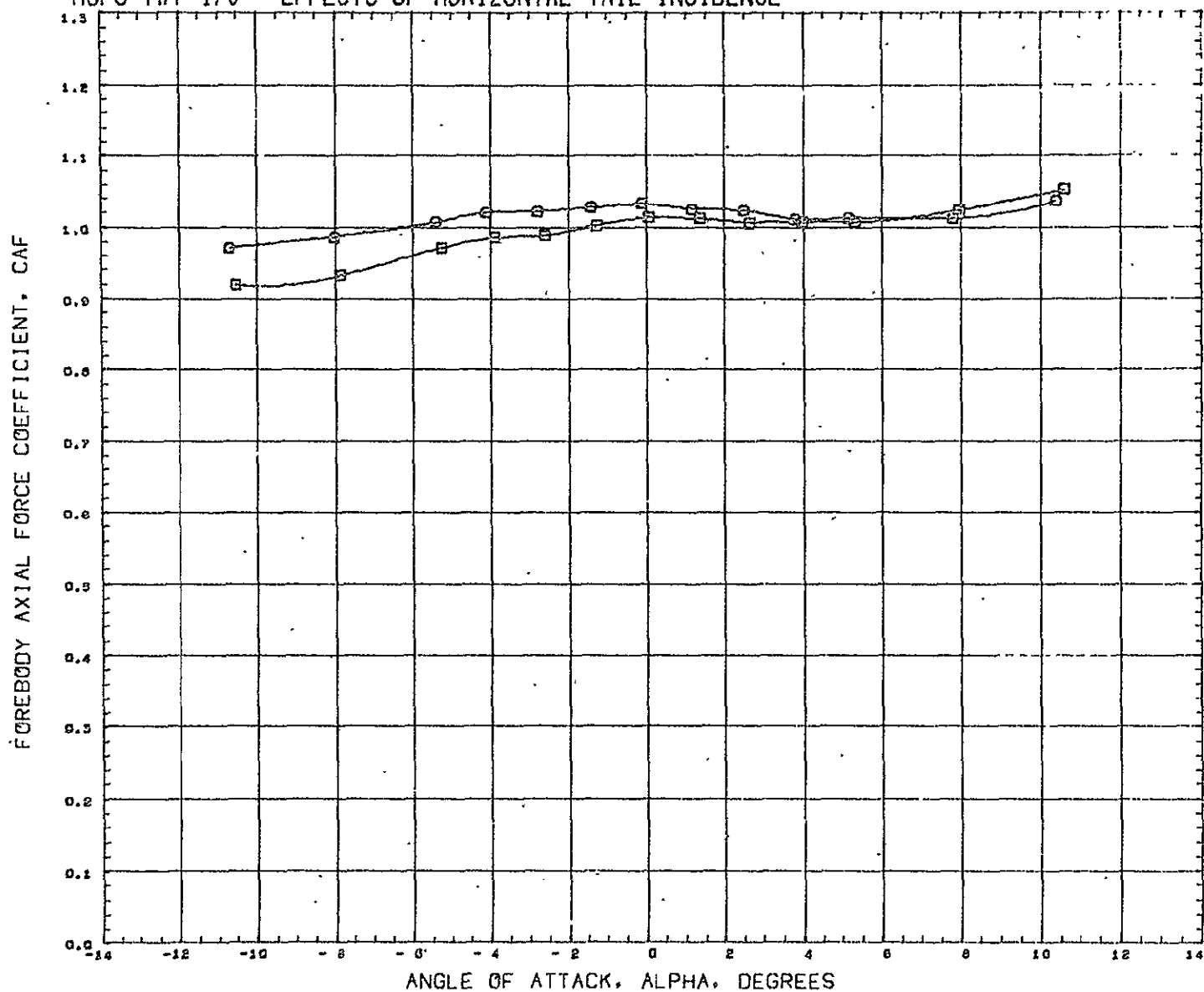
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TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE



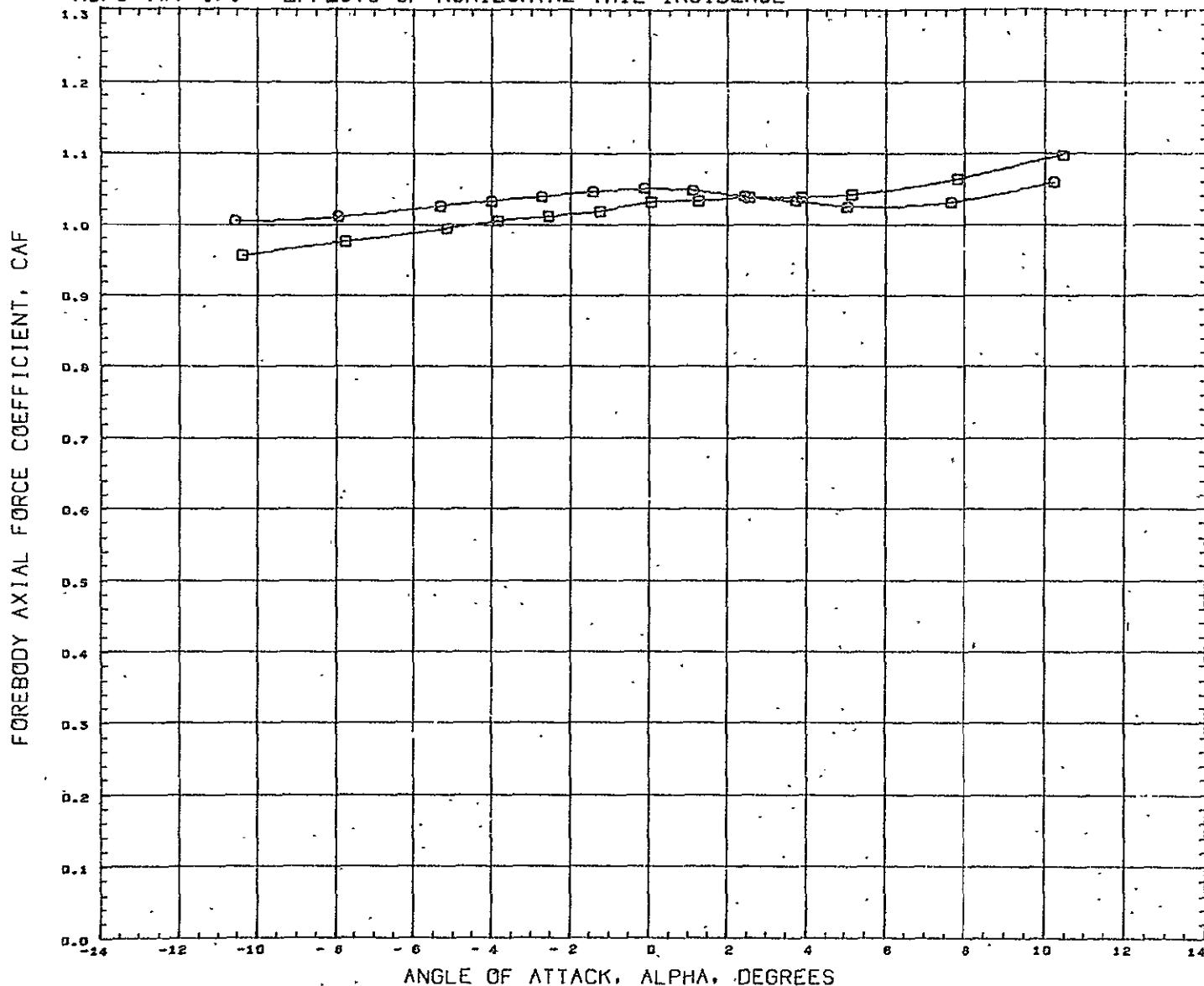
SYMBOL HTAIL
○ - 5.000
□ - 0.000

PARAMETRIC VALUES
HACH 1.199 BETA - 0.020
ORINC - 1.050 WNGINC 4.000
PHIB 0.000

REFERENCE INFORMATION
REFS 1.3960 SQ. IN.
REFL 1.3330 INCHES
REFB 1.3330 INCHES
XMRP 1.2640 INCHES
YMRP 0.0000 INCHES
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SCALE 0.3305 PERCENT

REFERENCE FILE

MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE

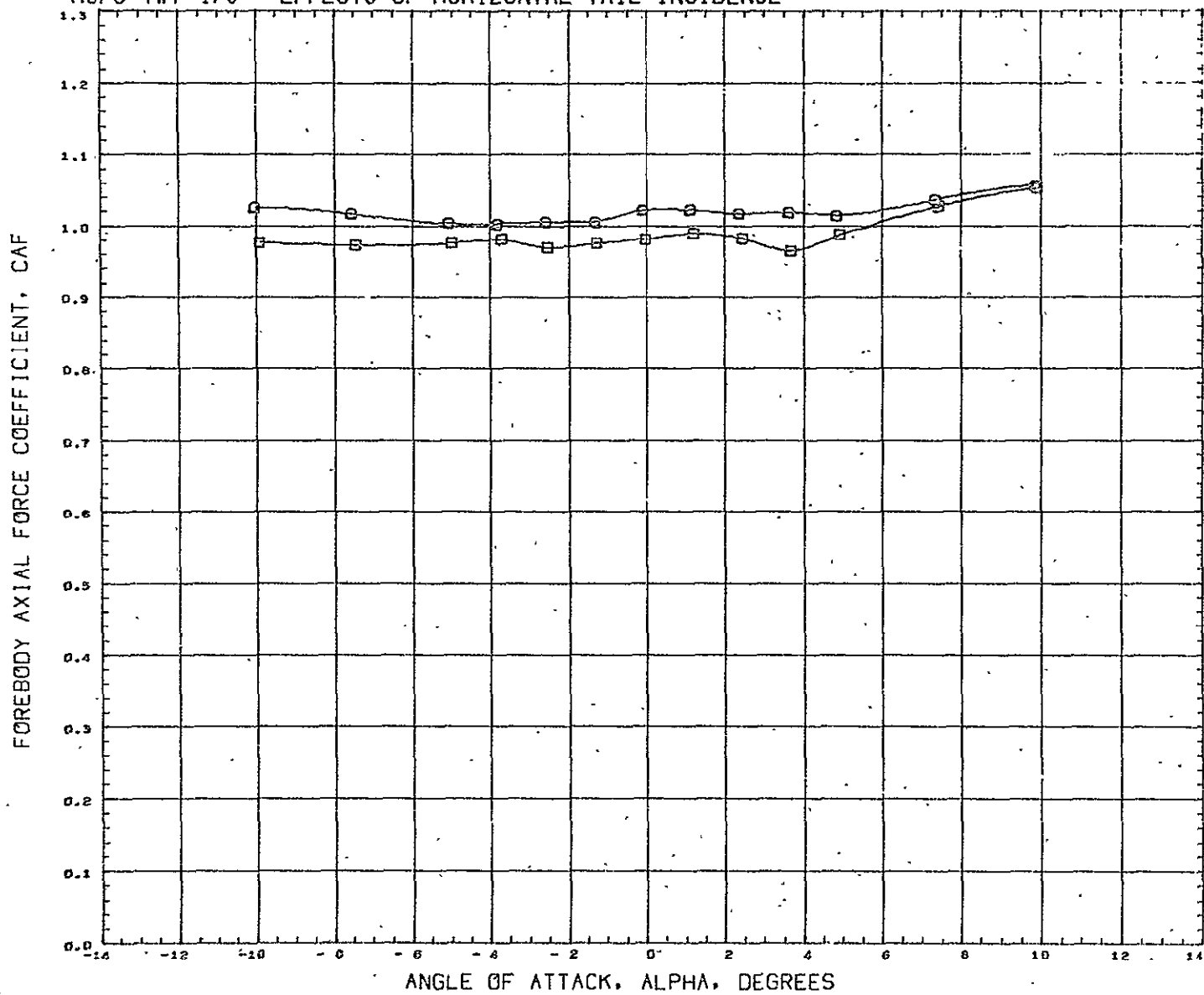


SYMBOL	HTAIL	PARAMETRIC VALUES			
○	- 5.000	HACH	1.454	BETA	- 0.020
□	0.000	ORBINC	- 1.050	WNGINC	4.000
		PHIB	0.000		

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	- 1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE

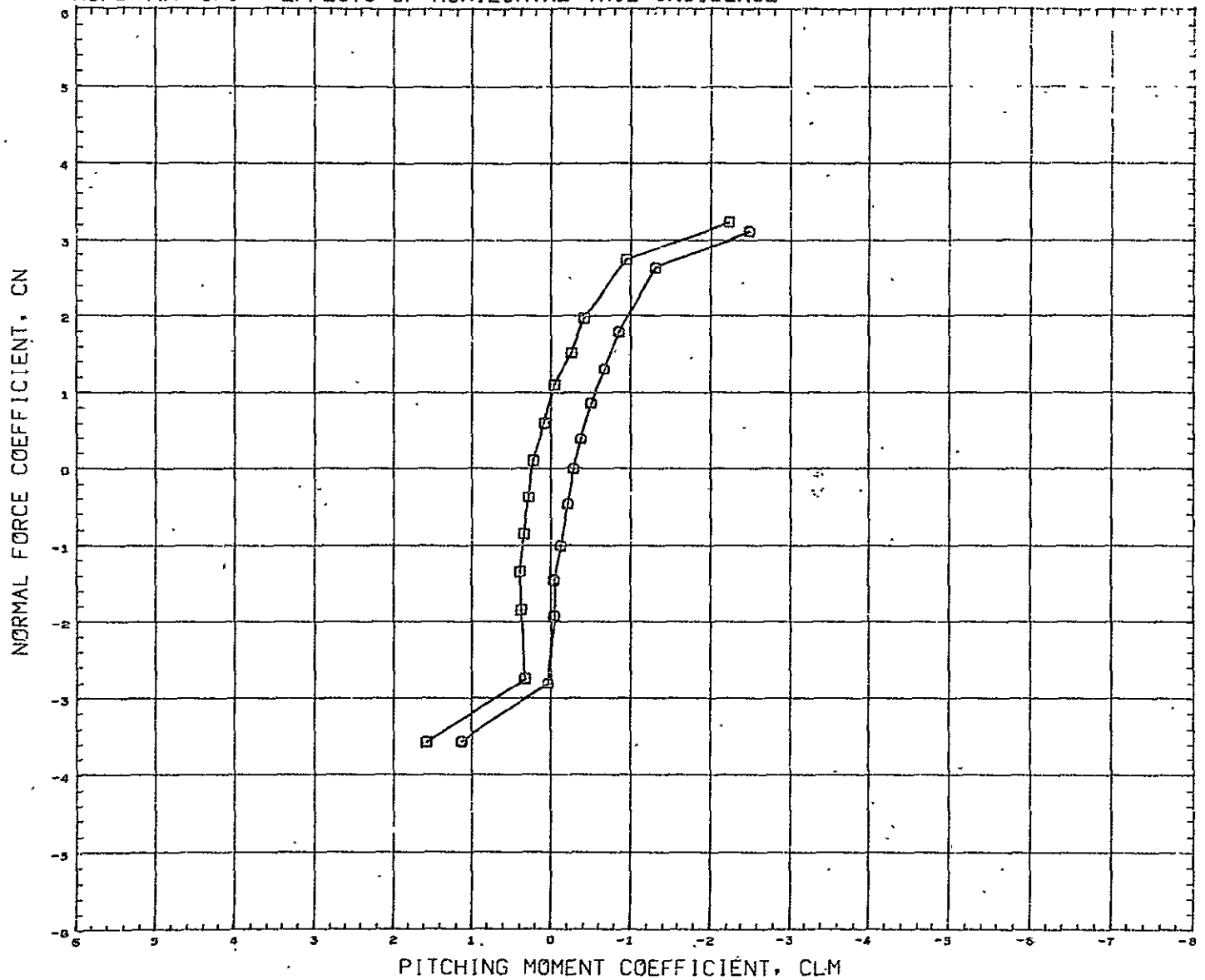


SYMBOL	HTAIL	PARAMETRIC VALUES			
○	5.000	MACH	1.951	BETA	0.020
□	0.000	ORBINC	1.050	WINGINC	4.000
		PNIB	0.000		

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE



SYMBOL HTAIL
 O - 5.000
 □ - 0.000

PARAMETRIC VALUES
 HACH 0.598 BETA - 0.020
 ORBINC - 1.050 WNGINC 4.000
 PHIB 0.000

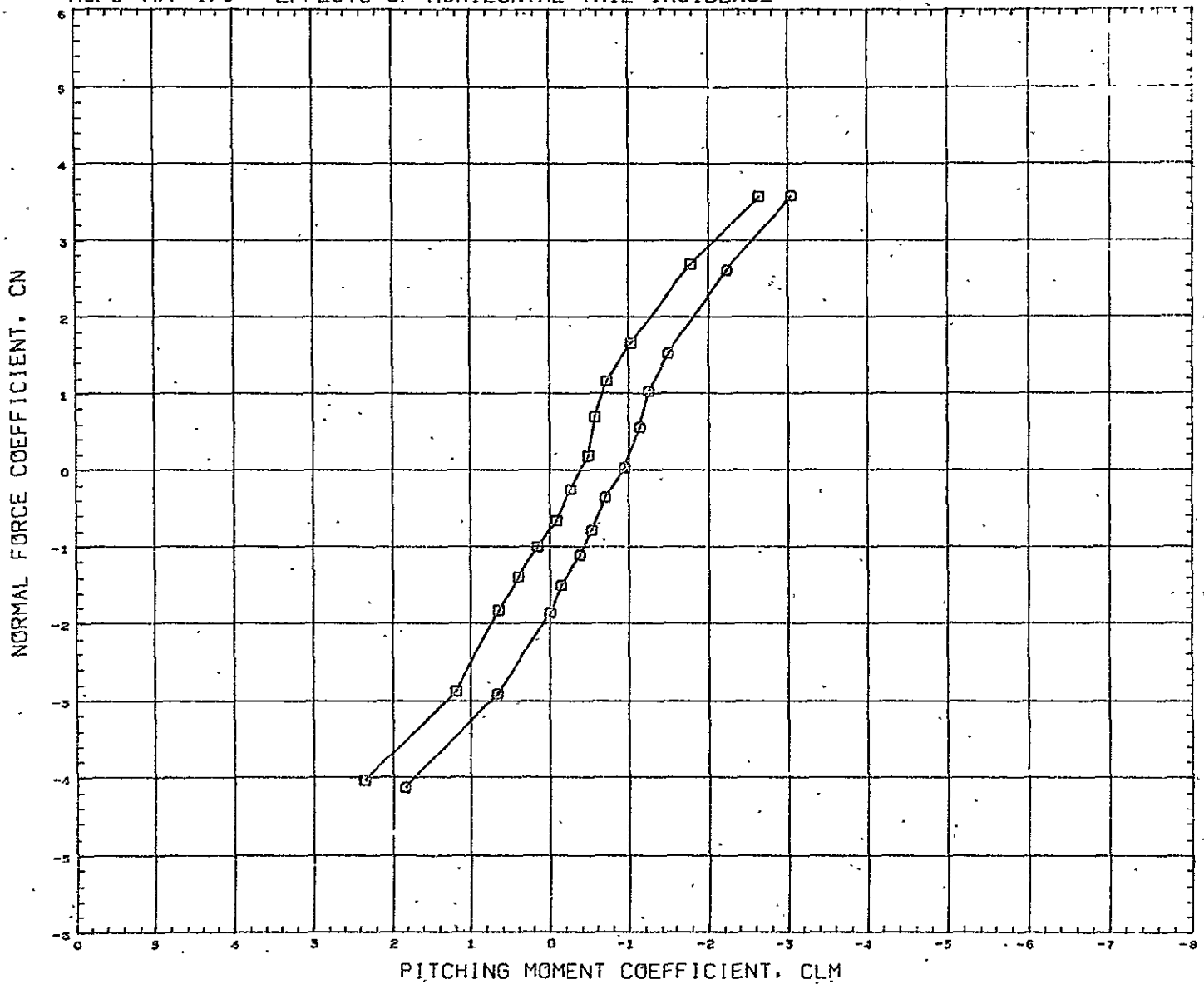
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 REFB 1.3330 INCHES
 XNRP 5.2640 INCHES
 YNRP 0.0000 INCHES
 ZNRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

REFERENCE FILE

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MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE

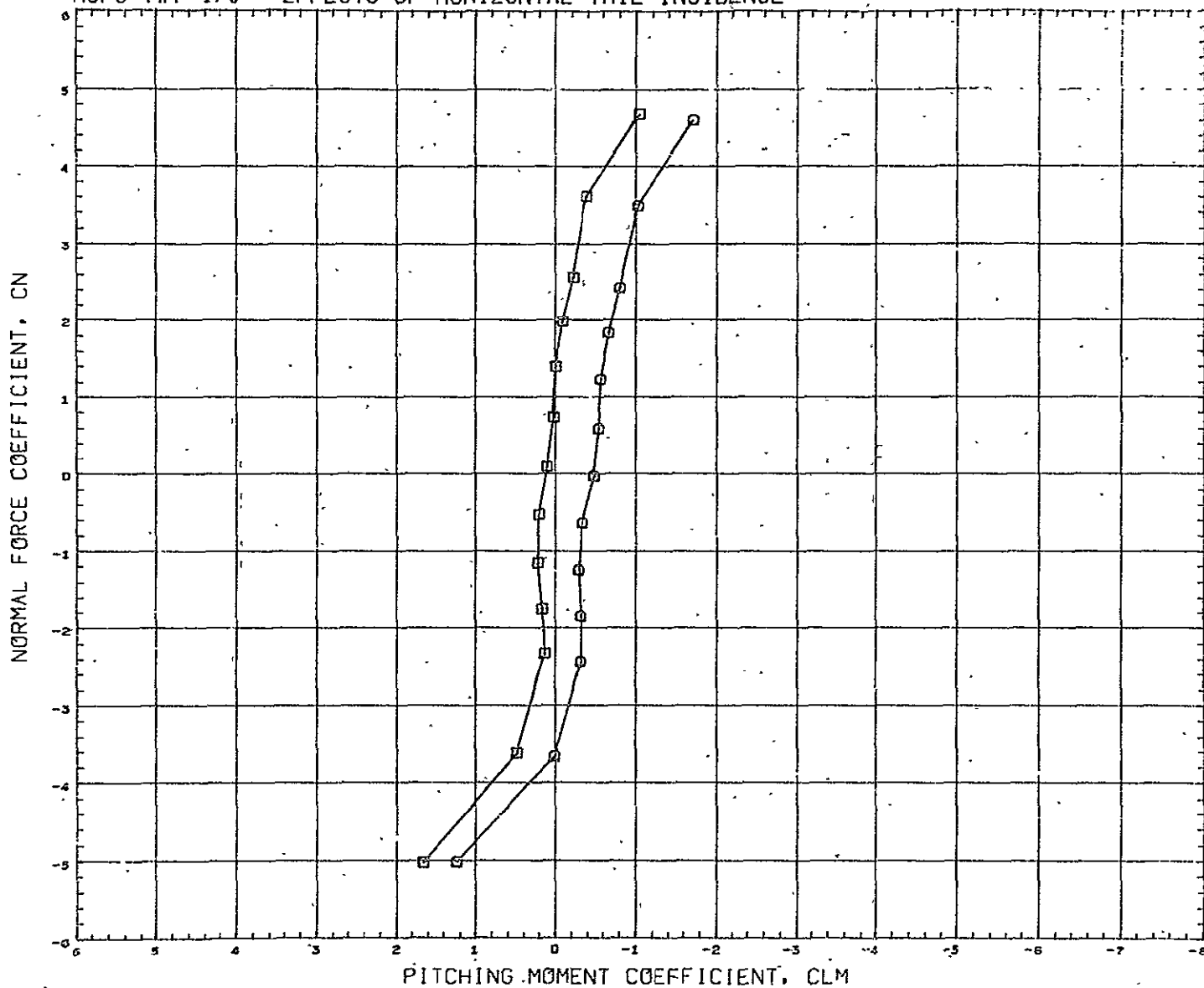


SYMBOL	HTAIL	PARAMETRIC VALUES			
○	5.000	NACH	0.893	BETA	- 0.020
□	0.000	ORBNIC	- 1.050	WNGINC	4.000
		PHIB	0.000		

REFERENCE INFORMATION		
REFS	1.3960	50.1N.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

MSFC IWI 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE



SYMBOL NTAIL
 O - 5.000
 □ 0.000

PARAMETRIC VALUES
 MACH 0.995 BETA - 0.020
 ORBINC - 1.050 WNGINC 4.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ.IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
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 YHRP 0.0000 INCHES
 ZHRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

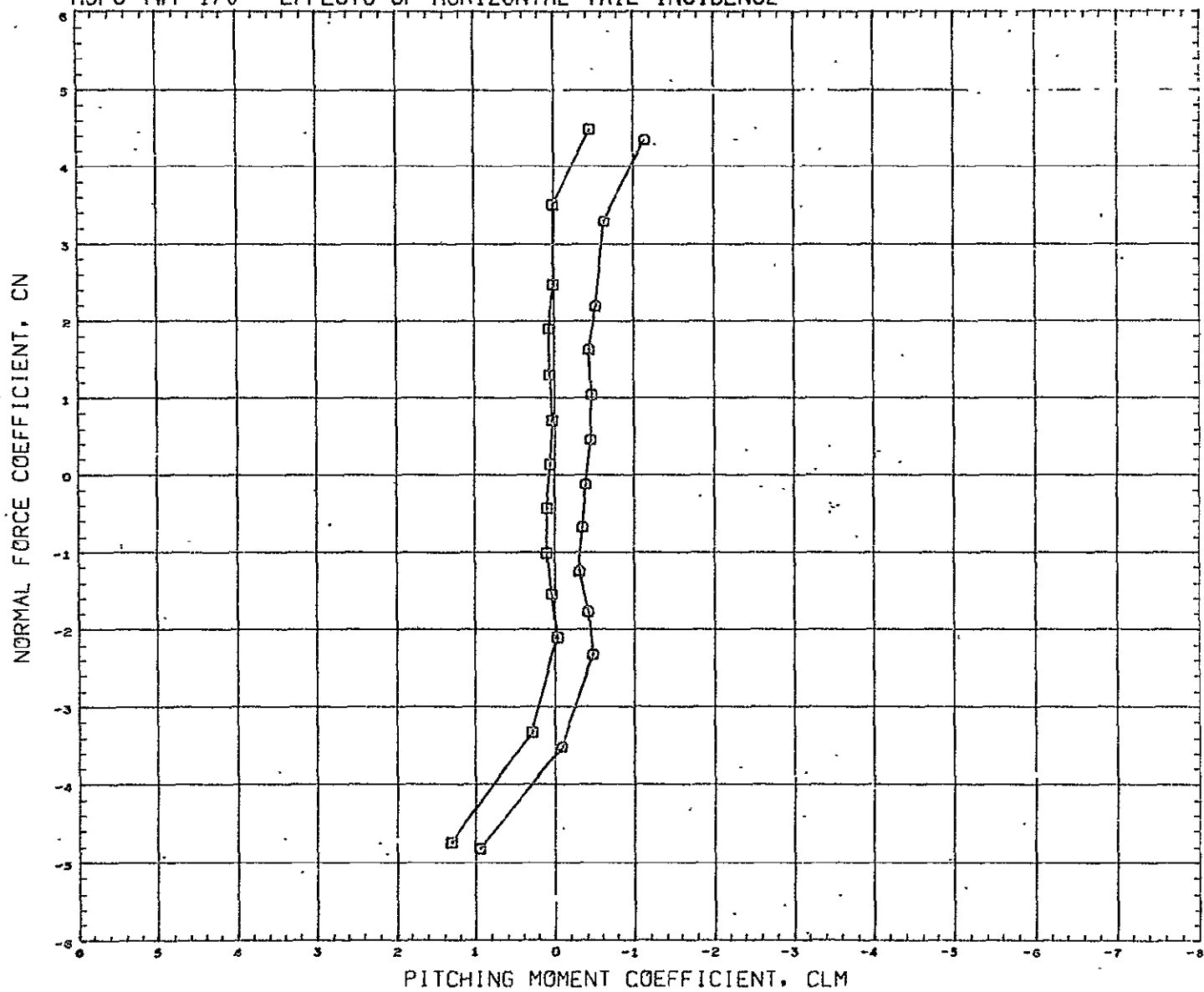
REFERENCE FILE

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MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE

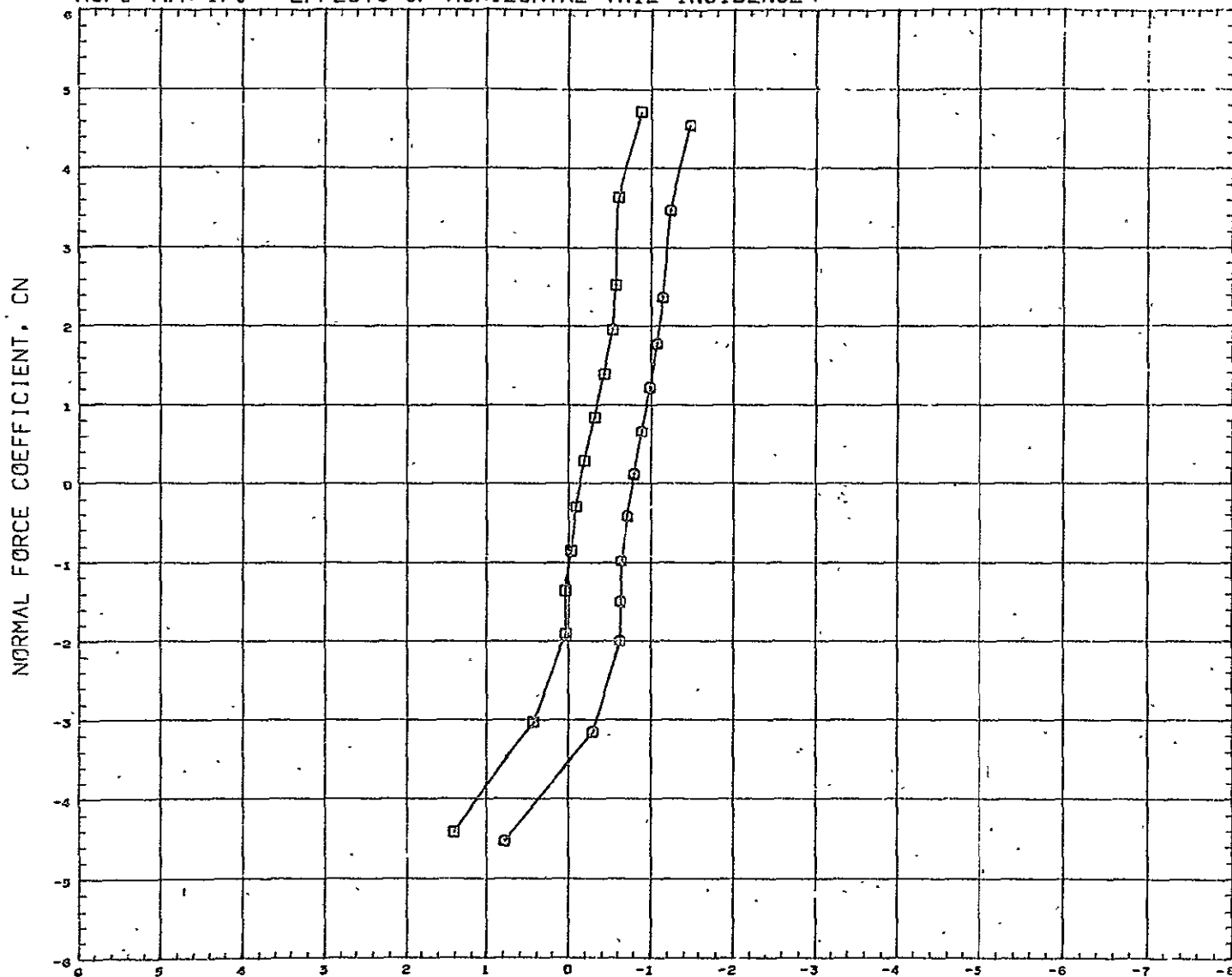


SYMBOL	HTAIL	PARAMETRIC VALUES			
○	5.000	HACH	1.093	BETA	0.020
□	0.000	ORBINC	1.050	WNGINC	4.000
		PHIB	0.000		

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3980	Sq. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
KMRP	5.2640	INCHES
YHRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT. 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE



SYMBOL	NTAIL	PARAMETRIC VALUES			
□	- 5.000	MACH	1.199	BETA	- 0.020
○	0.000	ORBITC	- 1.050	WINGC	4.000
		PHIS	0.000		

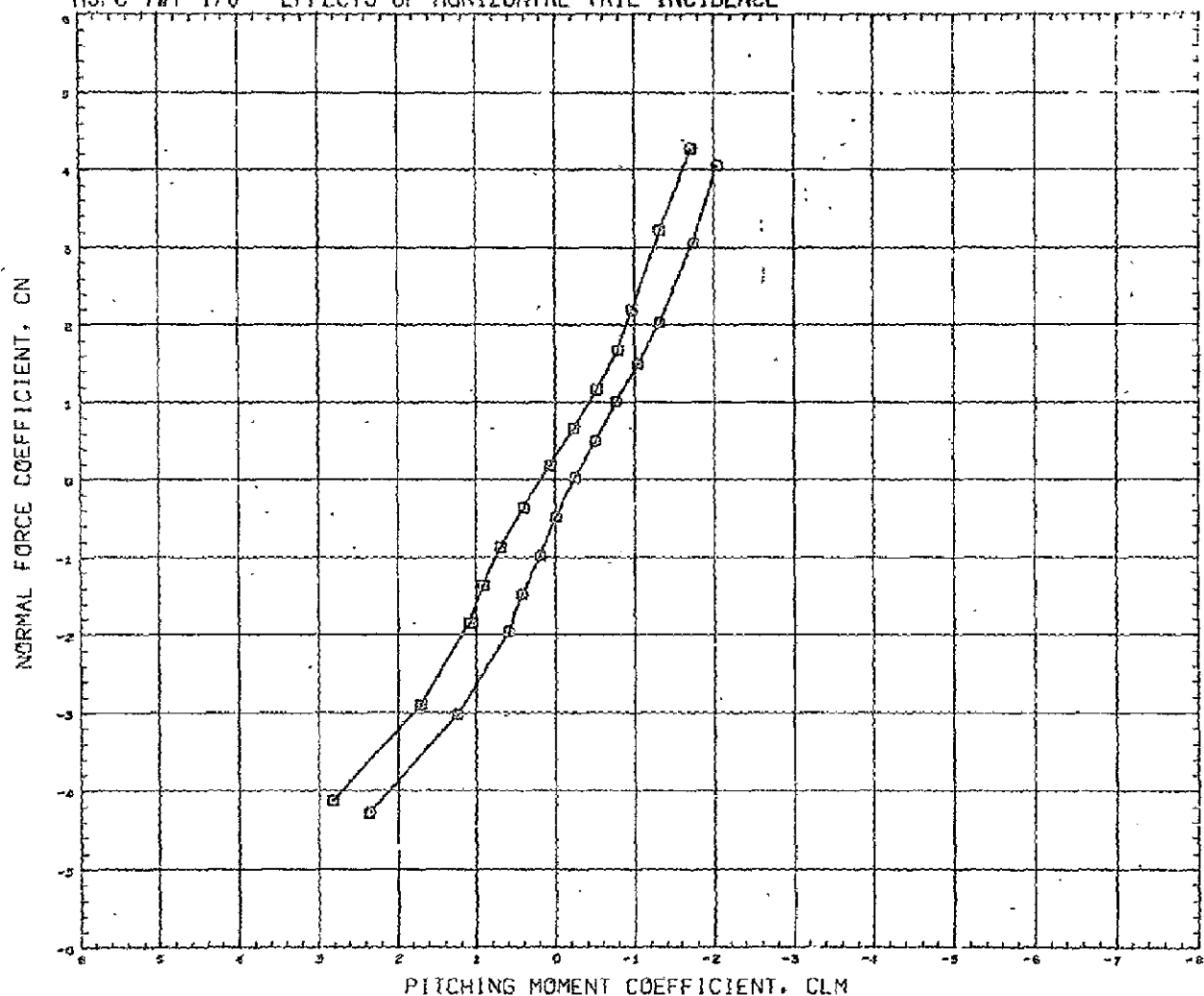
REFERENCE INFORMATION		
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REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE



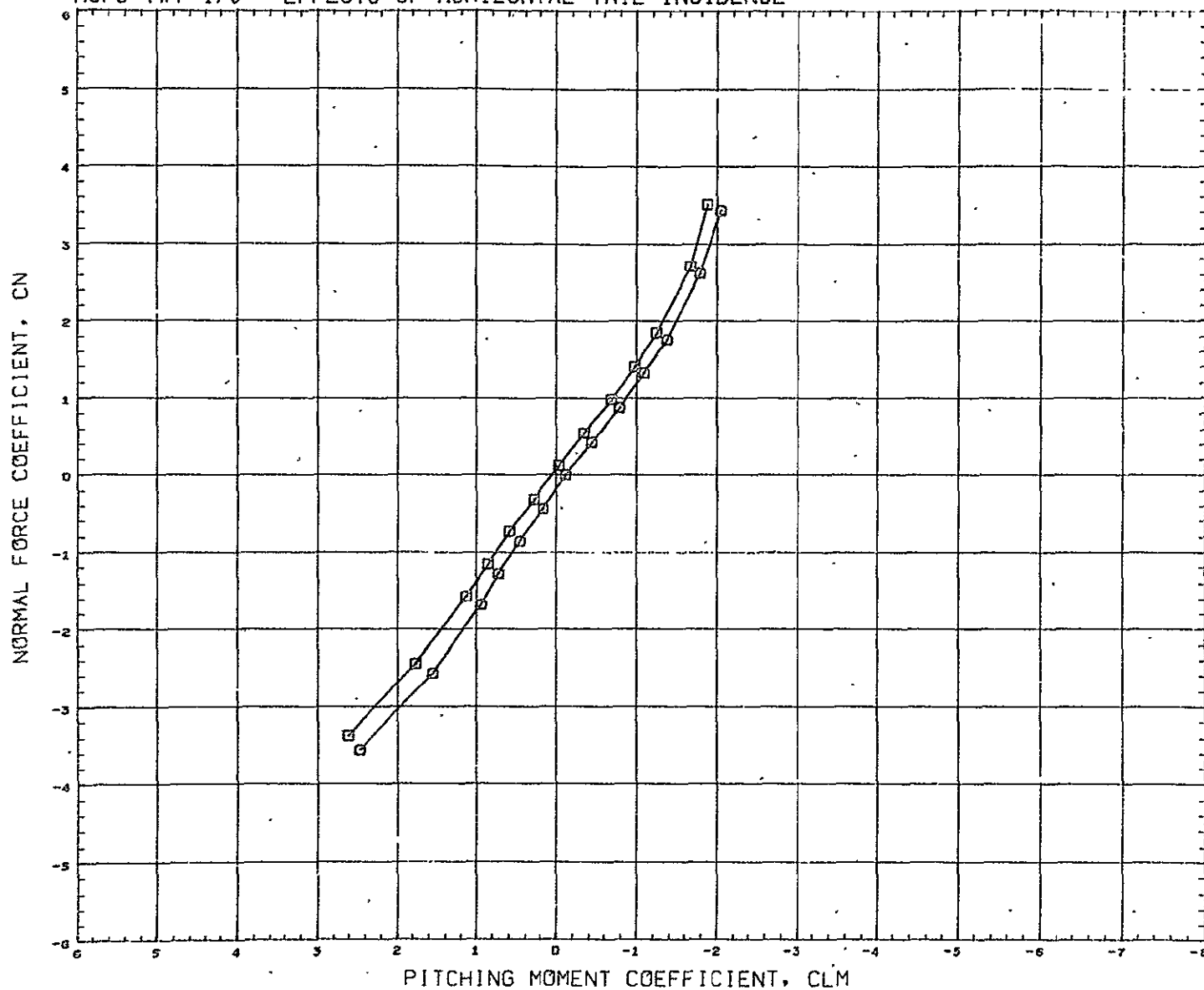
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□	0.000	DRBINC	1.050	MNGINC	4.000	REFL	1.3330
		PHIB	0.000			REFB	1.3330
						XMRP	5.2640
						YMRP	0.0000
						ZMRP	0.0000
						SCALE	0.3366
							PERCENT

REFERENCE FILE

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 EFFECTS OF HORIZONTAL TAIL INCIDENCE



SYMBOL	HTAIL	PARAMETRIC VALUES			
○	5.000	MACH	1.961	BETA	- 0.020
□	0.000	ORBINC	- 1.050	WINGINC	4.000
		PHIB	0.000		

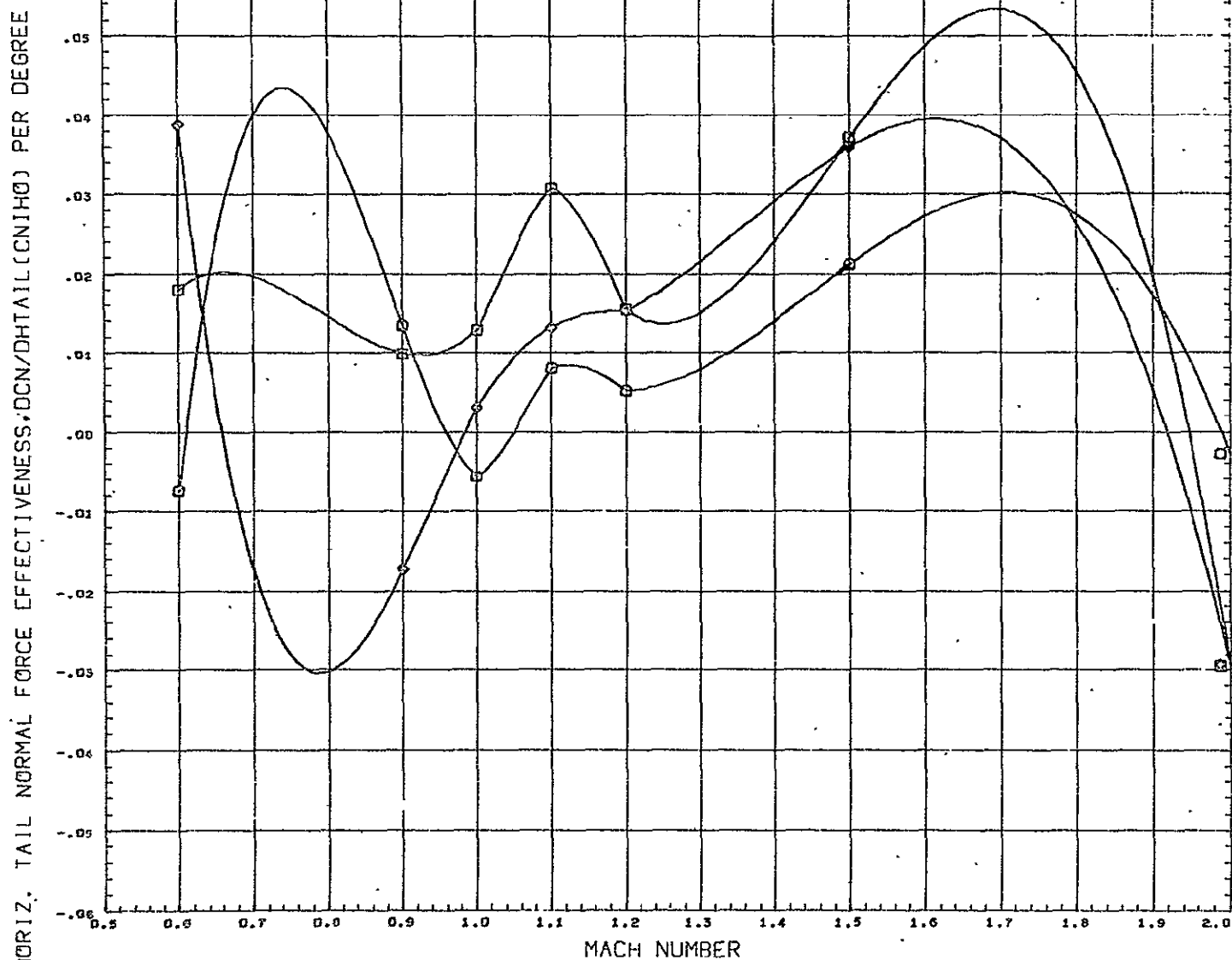
REFERENCE INFORMATION		
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REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

REFERENCE FILE

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 HORIZONTAL TAIL EFFECTIVENESS

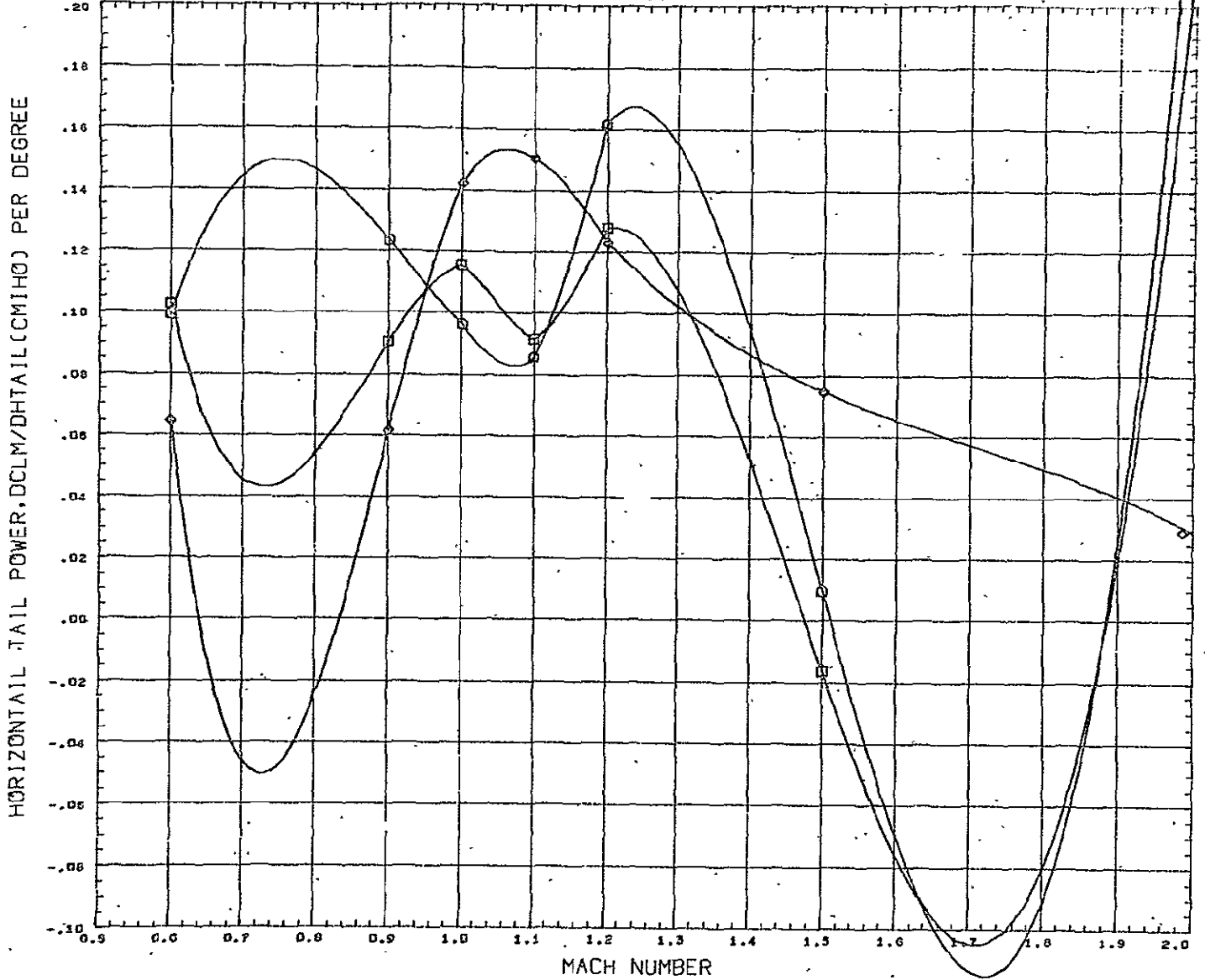


SYMBOL	ALPHA	PARAMETRIC VALUES			
○	-10.000	ORBINC	-1.050	WNGINC	4.000
□	0.000	HTAIL	0.000	PHIB	0.000
◇	10.000				

DATA HIST. CODE #F

REFERENCE INFORMATION		
REFS	1.3960	50-IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 HORIZONTAL TAIL EFFECTIVENESS



SYMBOL	ALPHA	PARAMETRIC VALUES			
○	-10.000	ORDINC	-1.050	WRCINC	4.000
□	0.000	HTAIL	0.000	PHIB	0.000
◇	10.000				

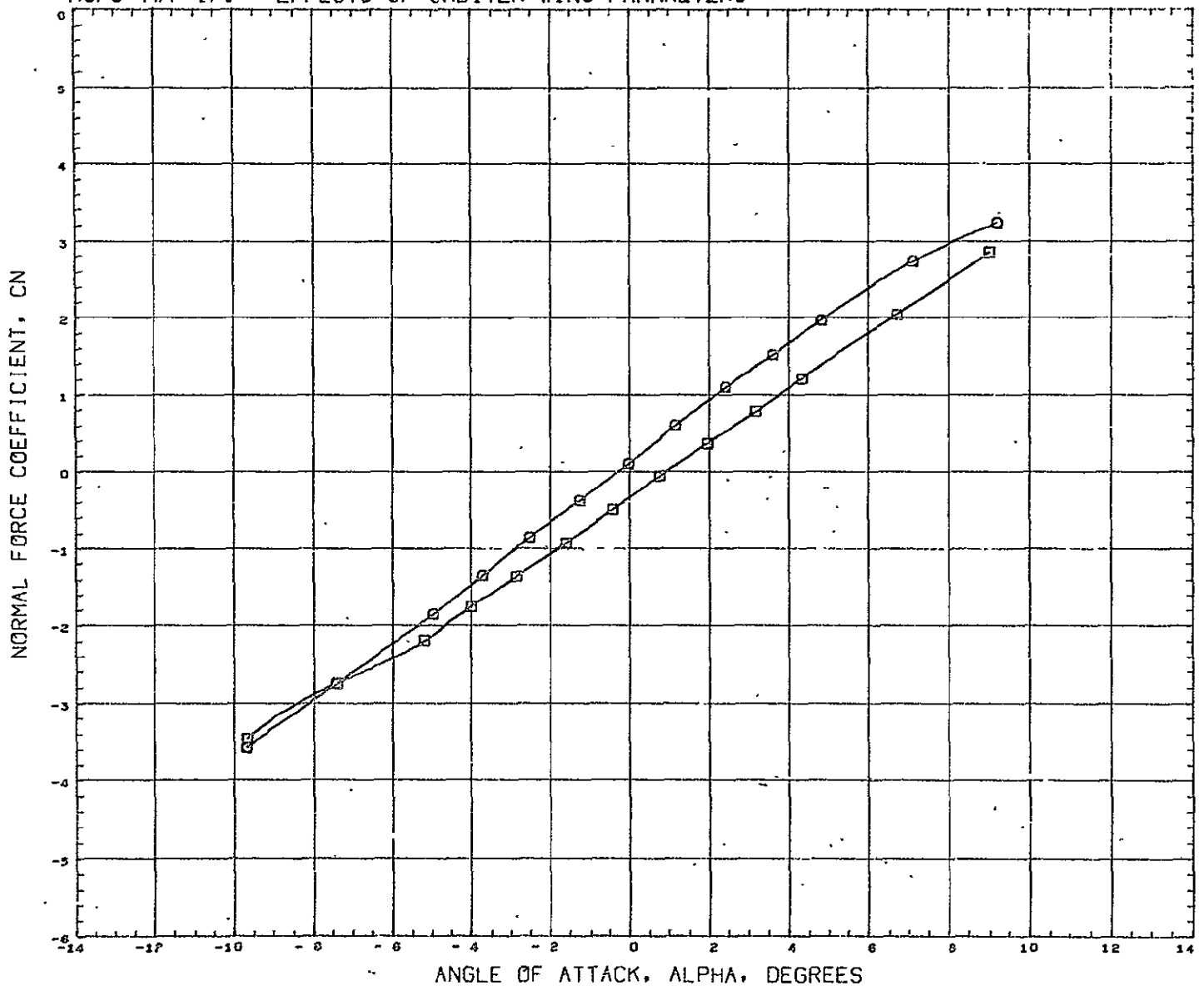
REFERENCE INFORMATION		
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REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

DATA HIST. CODE #P

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

(P24081) 29 JAN 71 PAGE 310

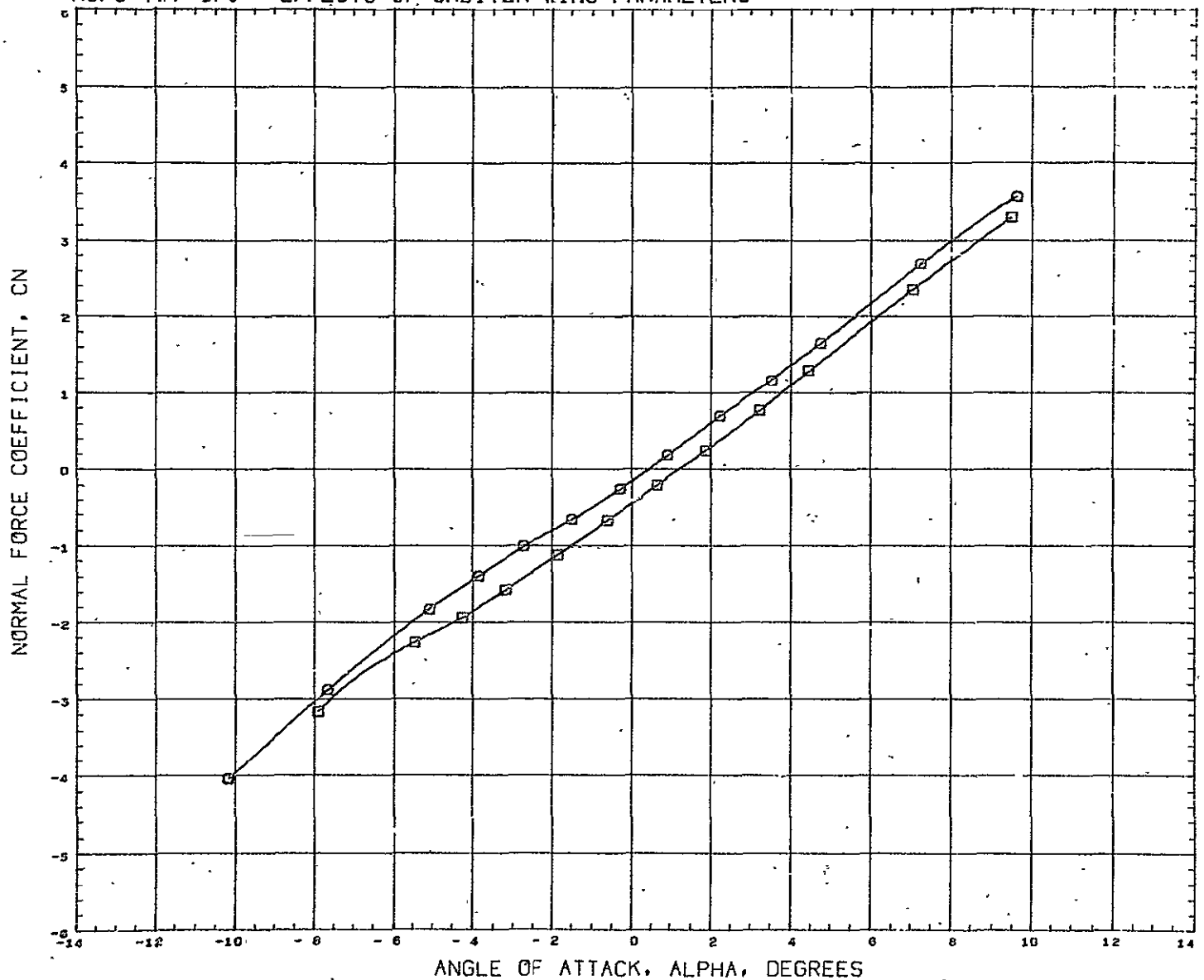
MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(024001)	TWT470 S-1C/GAC ORBITER BFLOWHVS BASIC	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ. IN.
(024161)	TWT470 S-1C/GAC ORBITER BFLOWHVS WING SPOILERS	WNGINC. 4.000 HTAIL 0.000	REFL 1.3330 INCHES
		PHIB 0.000	REFB 1.3330 INCHES
			XMRP 5.2640 INCHES
			YMRP 0.0000 INCHES
			ZMRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 0.599

MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(D24081) □ TWT470 S-IC/GAC ORBITER 9F10WHYS BASIC
(D24161) □ TWT470 S-IC/GAC ORBITER-BF10WHYS WING SPOILERS

PARAMETRIC VALUES

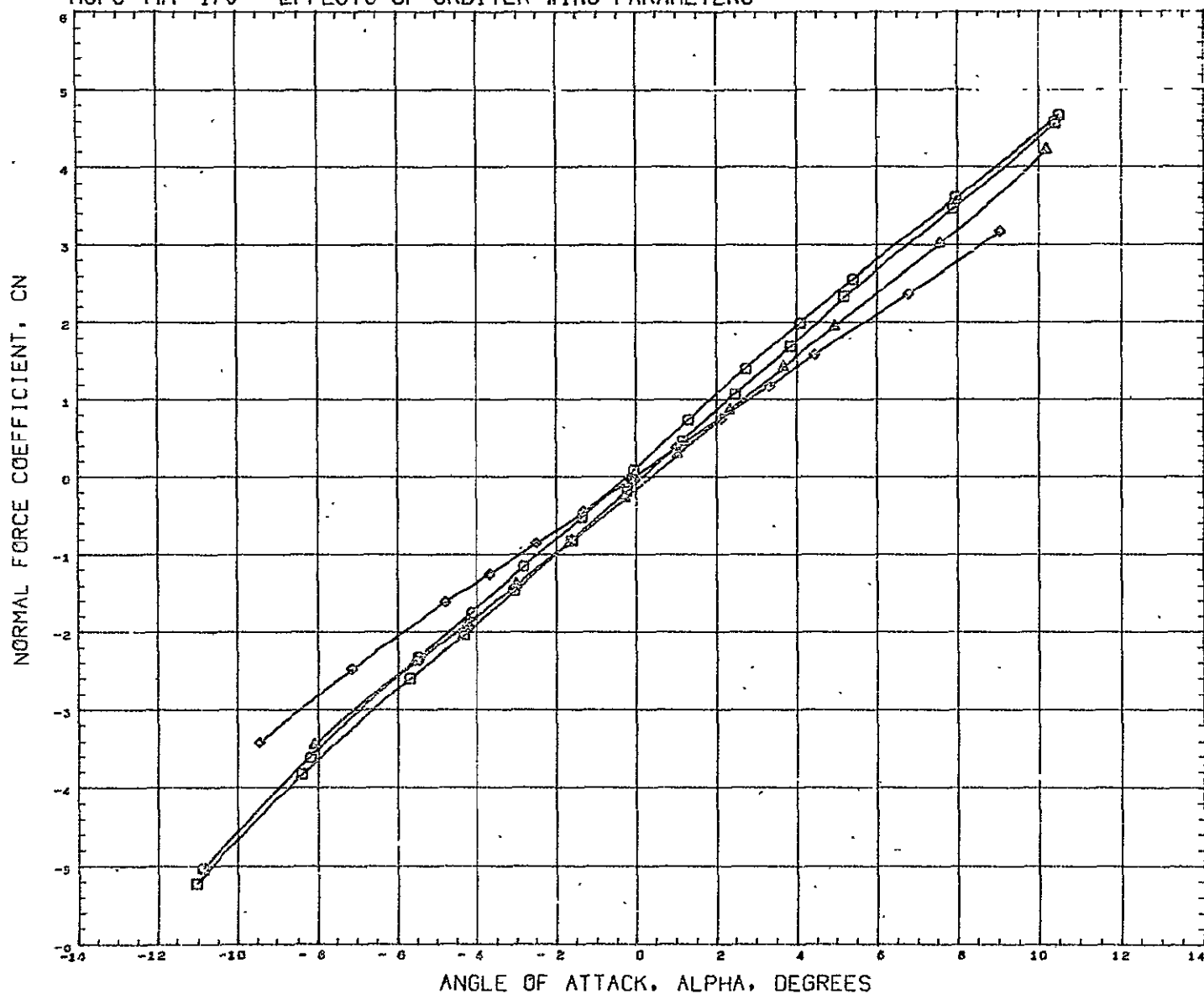
BETA - 0.050 ORBINC - 1.050
WNGINC 4.000 HTAIL 0.000
PHIB- 0.000

REFERENCE INFORMATION

REFS 1.3960 SQ. IN.
REFL 1.3330 INCHES
REFB 1.3330 INCHES
XNRP 5.2640 INCHES
YNRP 0.0000 INCHES
ZNRP 0.0000 INCHES
SCALE 0.3366 PERCENT

MACH 0.899

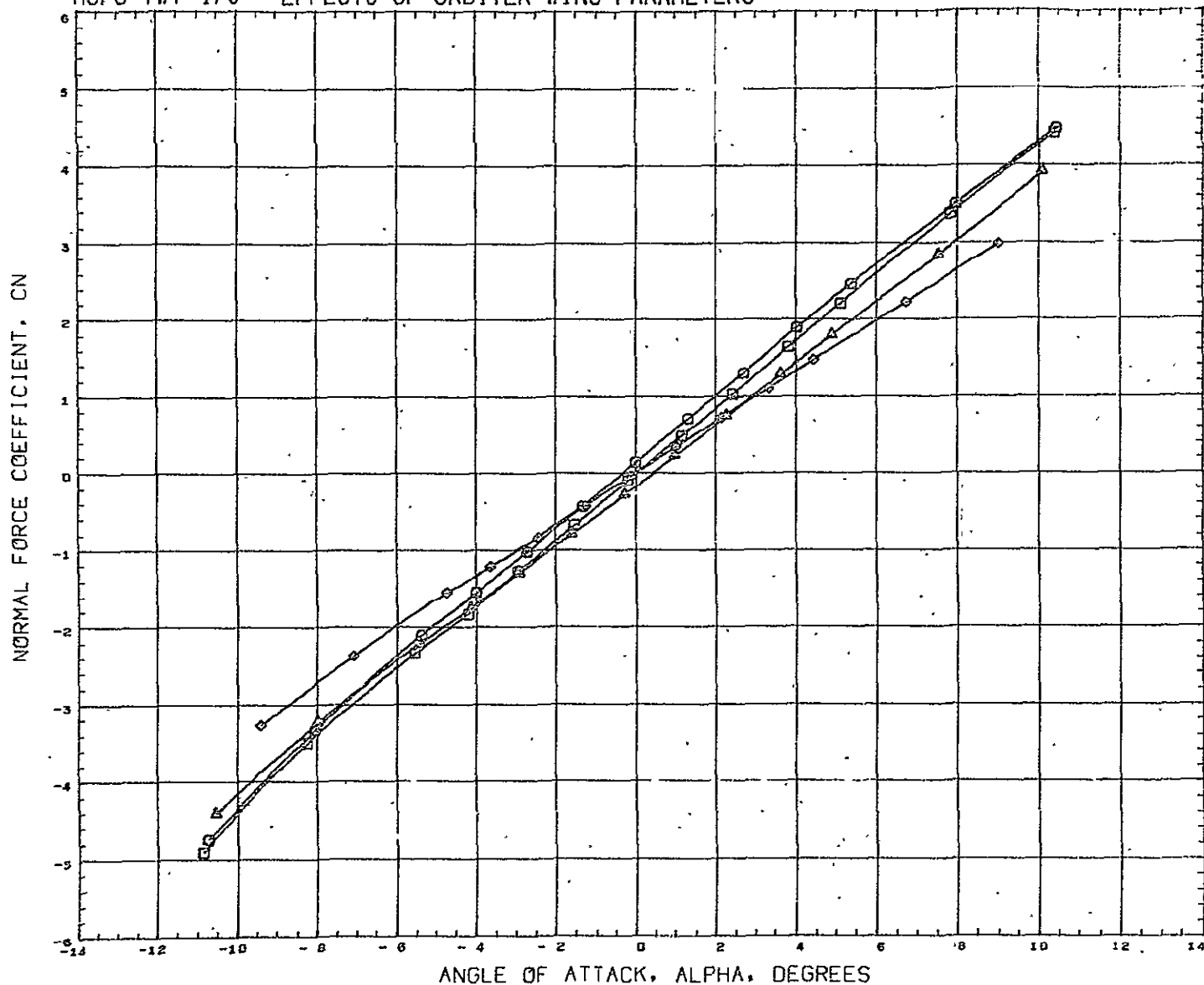
MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(E24081)	TWT470 S-1C/GAC ORBITER BF10HVS BASIC	BETA - 0.050 ORBINC. - 1.050	REFS 1.3960 SQ. IN.
(E24141)	TWT470 S-1C/GAC ORBITER BF10HVS WING INC = 2	WNGINC 4.000 NTAIL 0.000	REFL 1.3330 INCHES
(E24111)	TWT470 S-1C/GAC ORBITER BF10HVS WING OFF		REFB 1.3330 INCHES
(E24101)	TWT470 S-1C/GAC ORBITER BF10HVS WING SPOILERS	FHIB 0.000	XMRP 5.2640 INCHES
			YMRP 0.0000 INCHES
			ZMRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 0.997

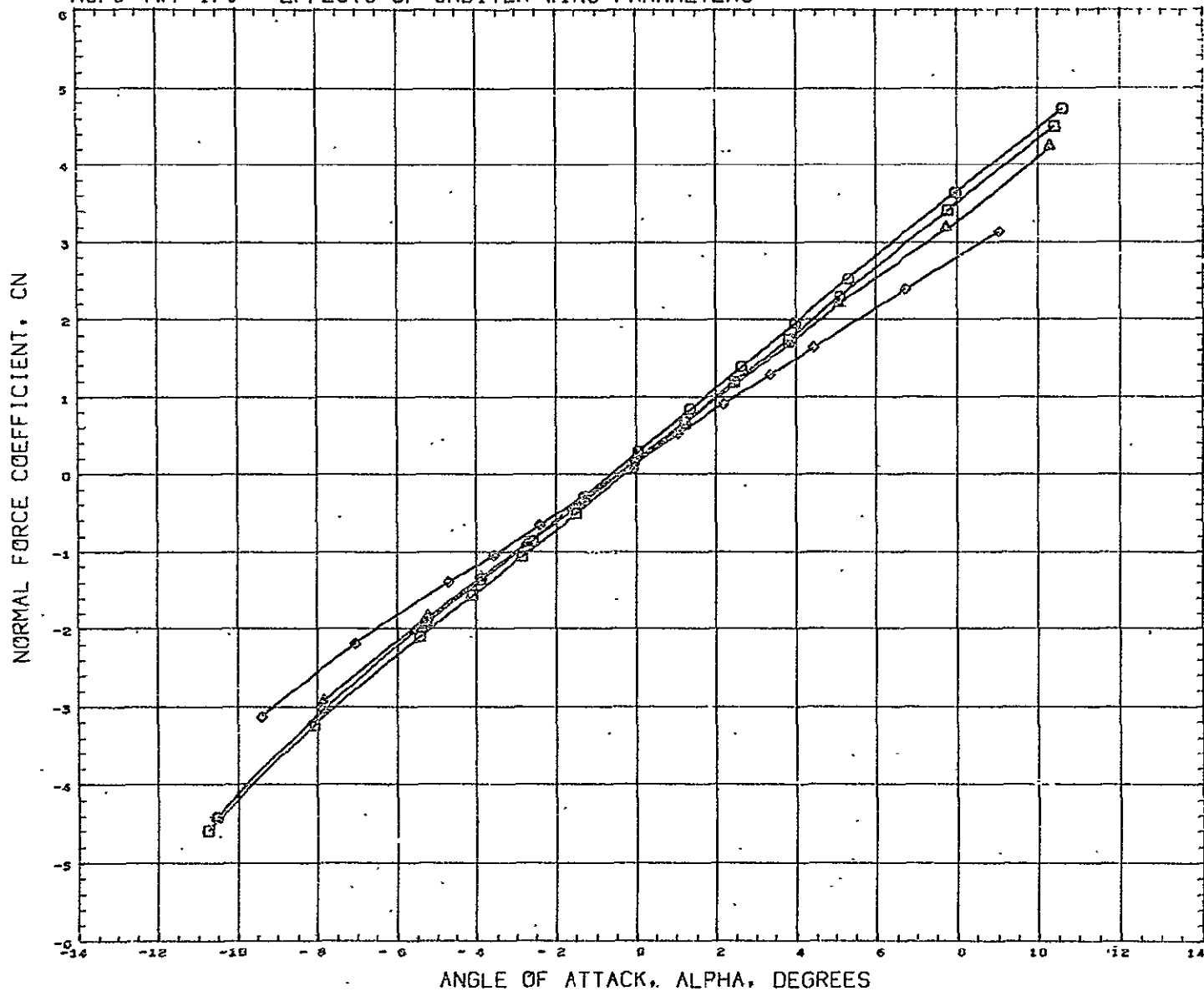
MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(E24081)	TWT470 S-1C/GAC ORBITER BF10HVS BASIC	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ. IN.
(E24141)	TWT470 S-1C/GAC ORBITER BF10HVS WING INC = 2	WNGINC 4.000 HTAIL 0.000	REFL 1.3330 INCHES
(E24111)	TWT470 S-1C/GAC ORBITER BF10HVS WING OFF	PH18 0.000	REFB 1.3330 INCHES
(E24161)	TWT470 S-1C/GAC ORBITER BF10HVS WING SPOILERS		XHRP 5.2640 INCHES
			YHRP 0.0000 INCHES
			ZHRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 1.095

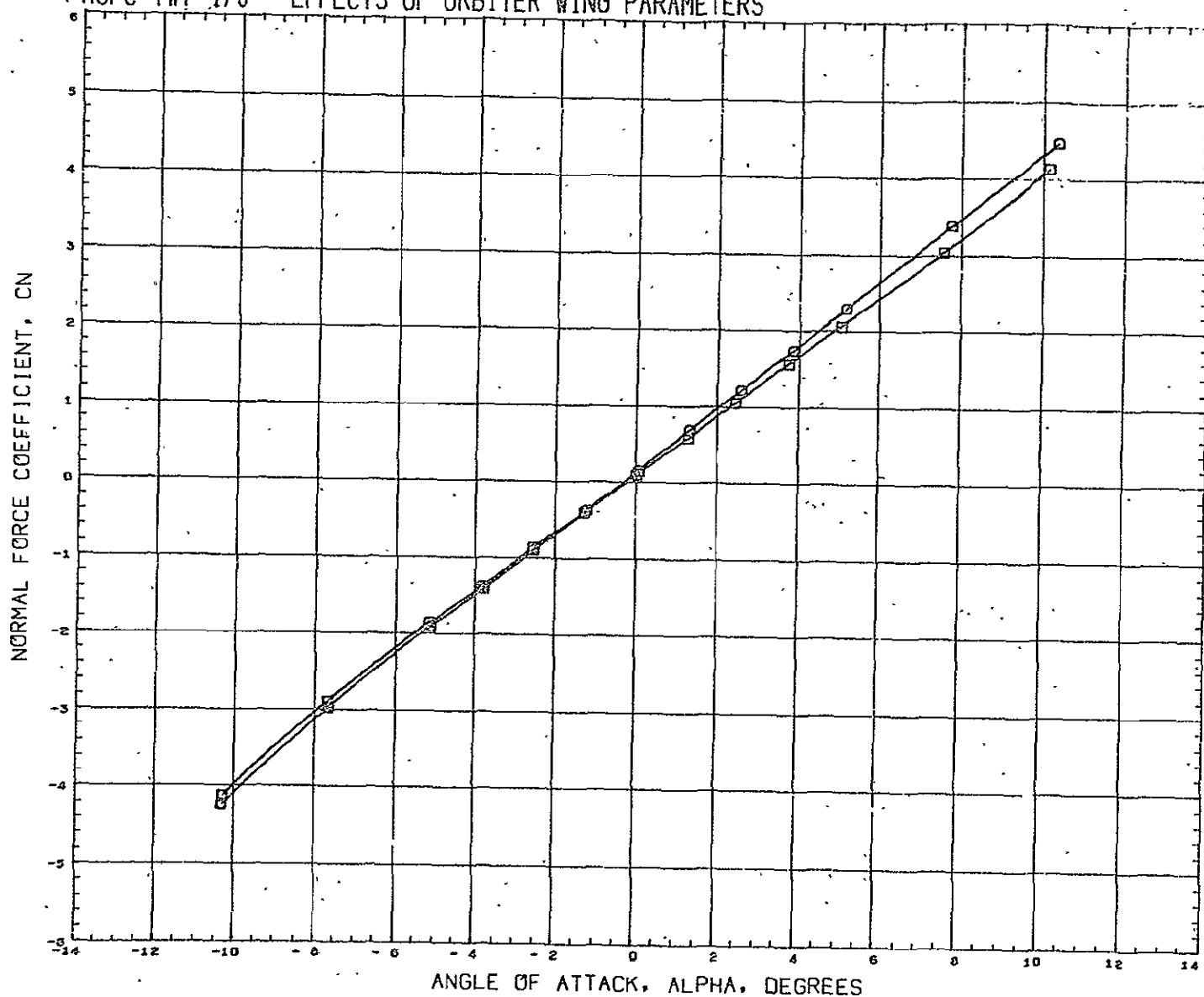
MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(E24081)	TWT470 S-IC/GAC ORBITER BF10HVS BASIC	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ. IN.
(E24141)	TWT470 S-IC/GAC ORBITER BF10HVS WING INC = 2	WNGINC 4.000 HTAIL 0.000	REFL 1.3330 INCHES
(E24111)	TWT470 S-IC/GAC ORBITER BF10HVS WING OFF	PHIB 0.000	REFB 1.3330 INCHES
(E24161)	TWT470 S-IC/GAC ORBITER BF10HVS WING SPOILERS		XMRP 5.2640 INCHES
			YMRP 0.0000 INCHES
			ZMRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 1.195

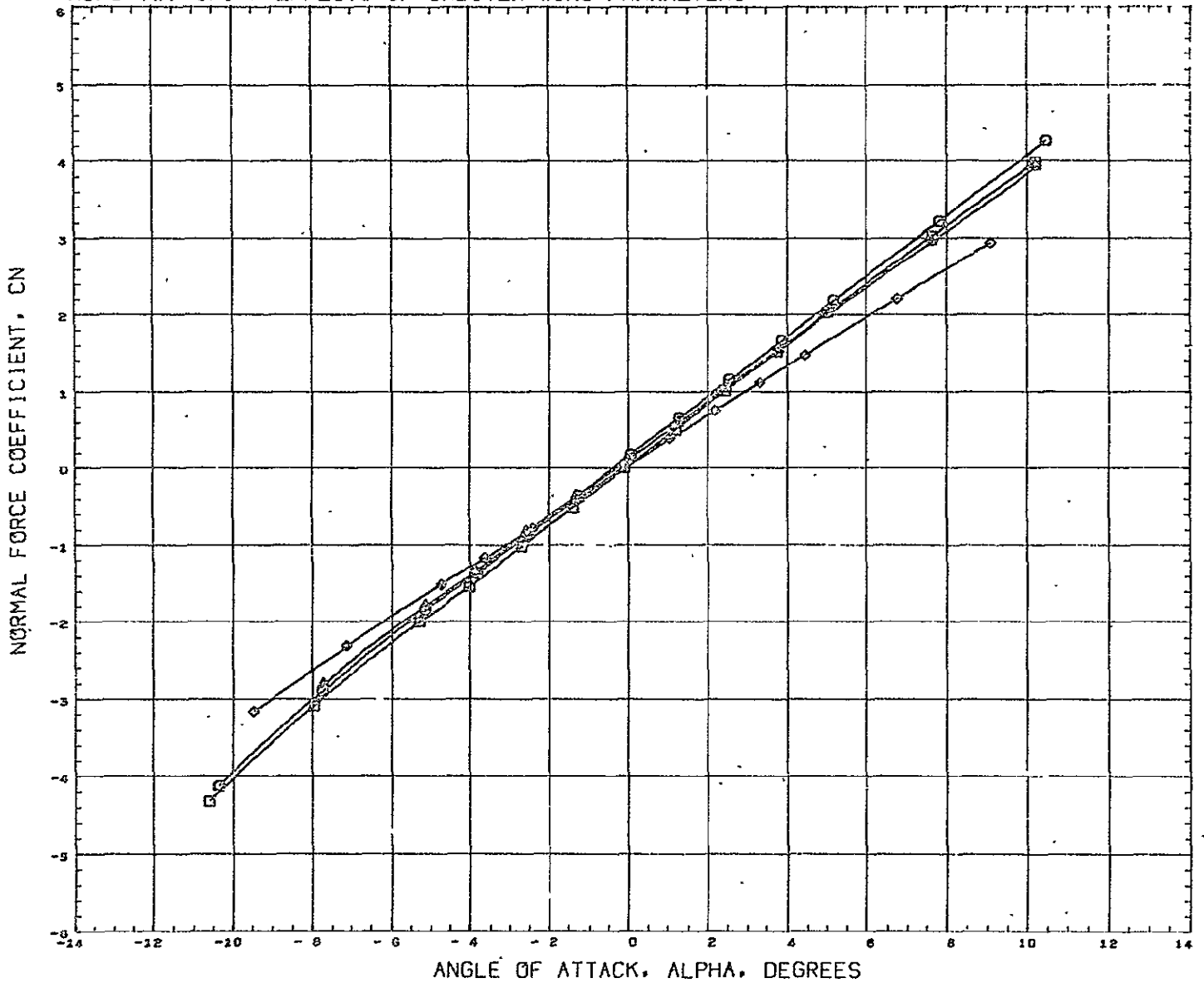
MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES				REFERENCE INFORMATION		
(F24081)	TWT470 S-IC/GAC ORBITER BF10WHVS BASIC	BETA	0.050	ORBINC	1.050	REFS	1.3360	SQ. IN.
(F24161)	TWT470 S-IC/GAC ORBITER BF10WHVS WING SPOILERS	WNGINC	4.000	HTAIL	0.000	REFL	1.3330	INCHES
		PHIB	0.000			REFB	1.3330	INCHES
						XMRP	5.2640	INCHES
						YMRP	0.0000	INCHES
						ZMRP	0.0000	INCHES
						SCALE	0.3366	PERCENT

MACH 1.303

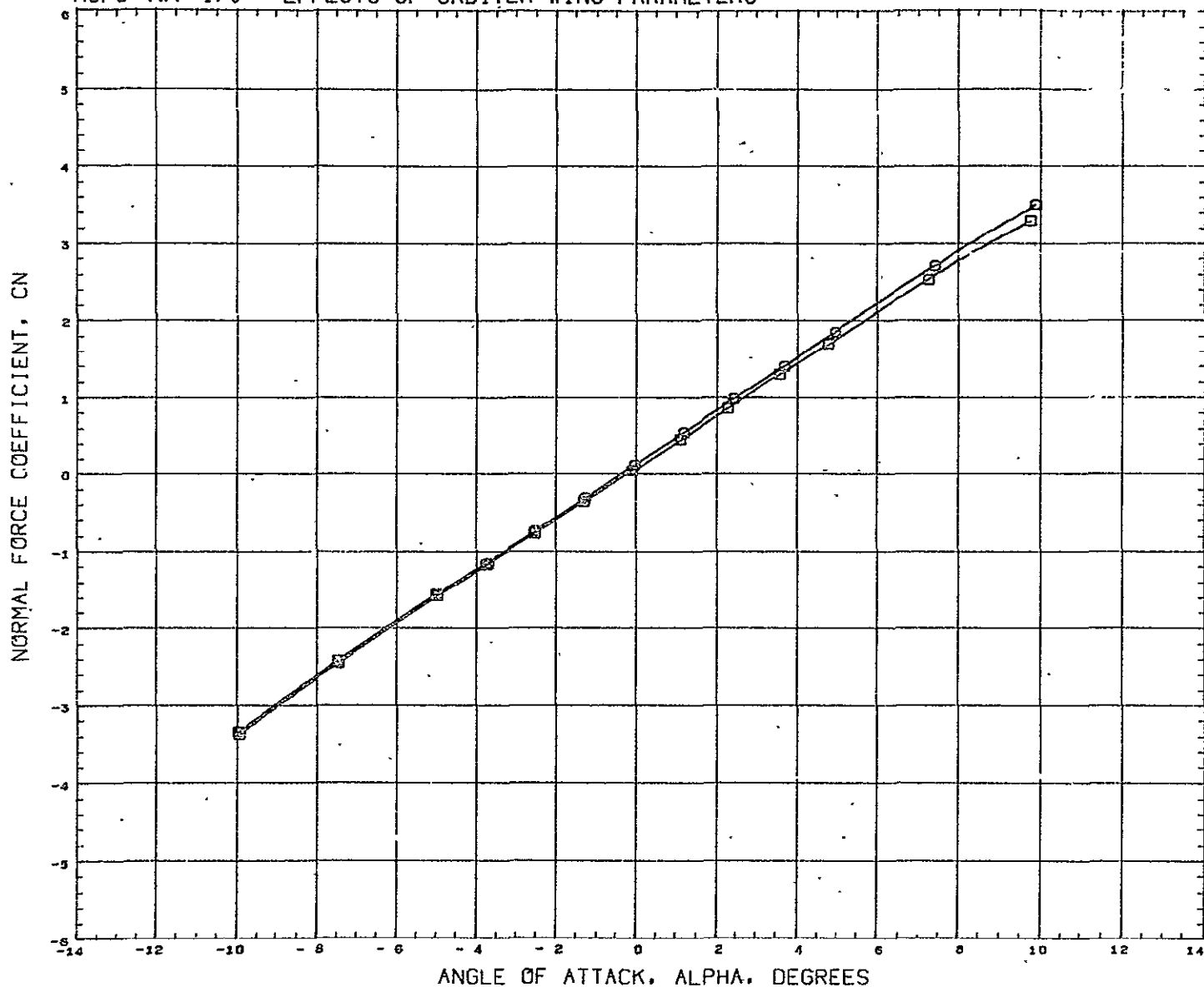
MSFC TWT 470 . EFFECTS OF ORBITER WING PARAMETERS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(624001)	TWT470 S-IC/GAC ORBITER BF10WHVS BASIC	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ. IN.
(624141)	TWT470 S-IC/GAC ORBITER BF10WHVS WING INC = 2	WNGINC 4.000 HTAIL 0.000	REFL 1.3330 INCHES
(624111)	TWT470 S-IC/GAC ORBITER BF10WHVS WING OFF		REFB 1.3330 INCHES
(624161)	TWT470 S-IC/GAC ORBITER BF10WHVS WING SPOILERS	PKIB 0.000	XMRP 5.2640 INCHES
			YNRP 0.0000 INCHES
			ZMRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 1.456

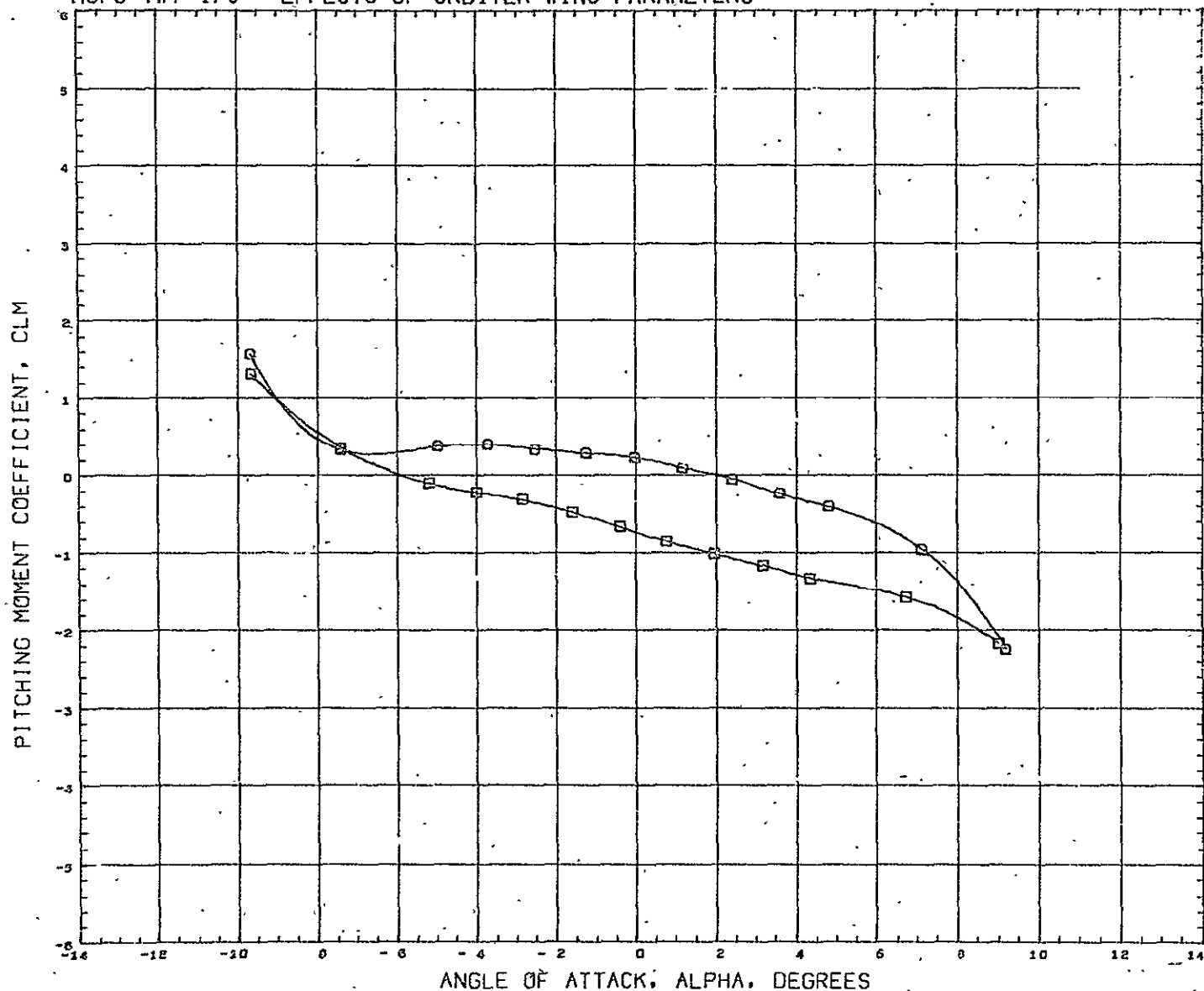
MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES				REFERENCE INFORMATION		
(324061)	TWT470 S-1C/GAC ORBITER BF10WHVS BASIC	BETA	- 0.050	ORBINC	- 1.050	REFS	1.3960	sq.in.
(324161)	TWT470 S-1C/GAC ORBITER BF10WHVS WING SPOILERS	WNGINC	4.000	HTAIL	0.000	REFL	1.3330	INCHES
		PHIB	0.000			REFB	1.3330	INCHES
						XHRP	5.2640	INCHES
						YHRP	0.0000	INCHES
						ZHRP	0.0000	INCHES
						SCALE	0.3366	PERCENT

HACH 1.967

MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(D24081) □ TWT470 S-1C/GAC ORBITER BFLOWHVS BASIC
(D24101) □ TWT470 S-1C/GAC ORBITER BFLOWHVS WING SPOILERS

PARAMETRIC VALUES

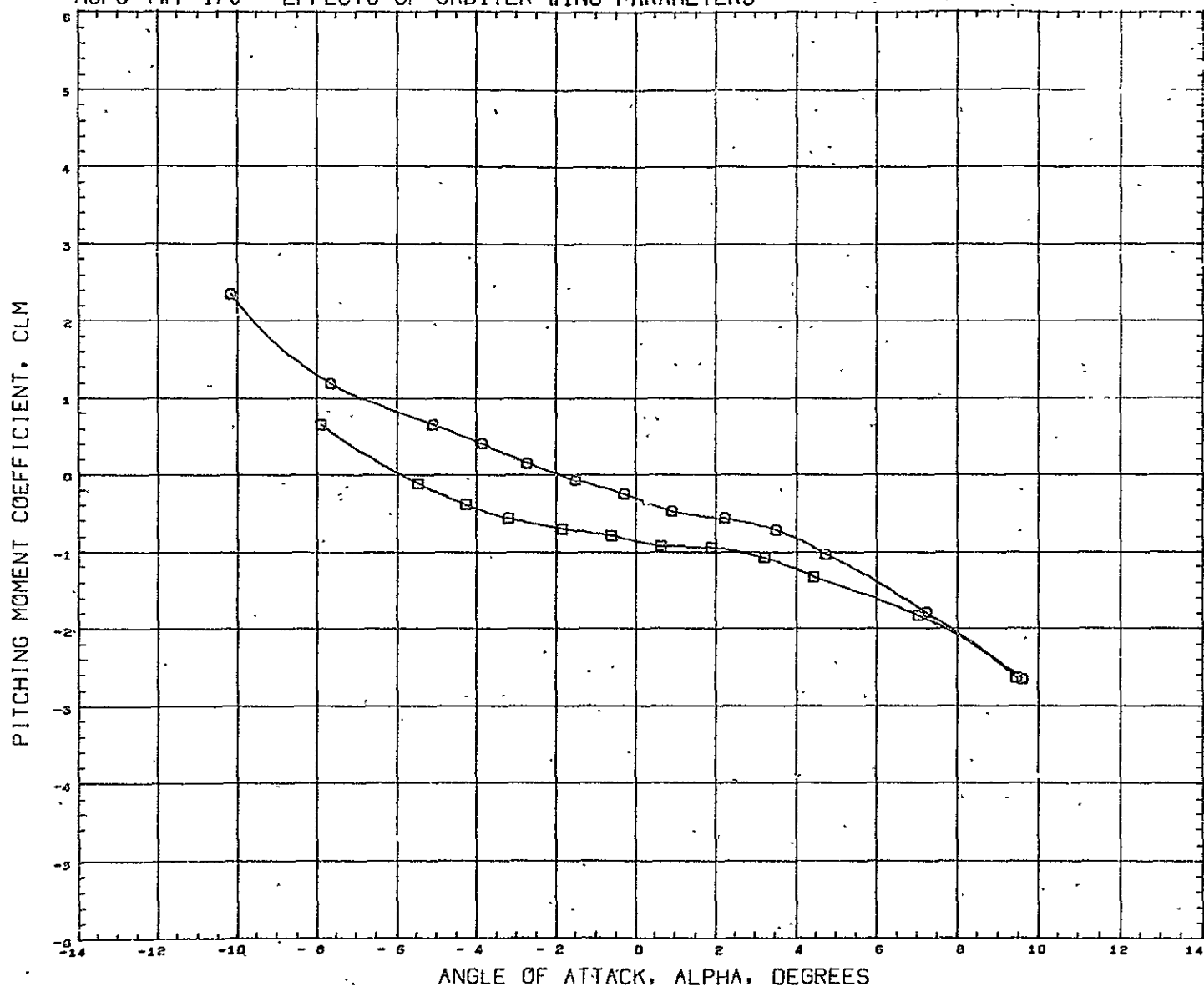
BETA - 0.050 ORBINC - 1.050
WNGINC 4.000 HTAIL - 0.000
PHIB 0.000

REFERENCE INFORMATION

REFS 1.3960 SQ. IN.
REFL 1.3330 INCHES
REFB 1.3330 INCHES
XHRF 5.2640 INCHES
YHRF 0.0000 INCHES
ZHRF 0.0000 INCHES
SCALE 0.3366 PERCENT

MACH 0.599

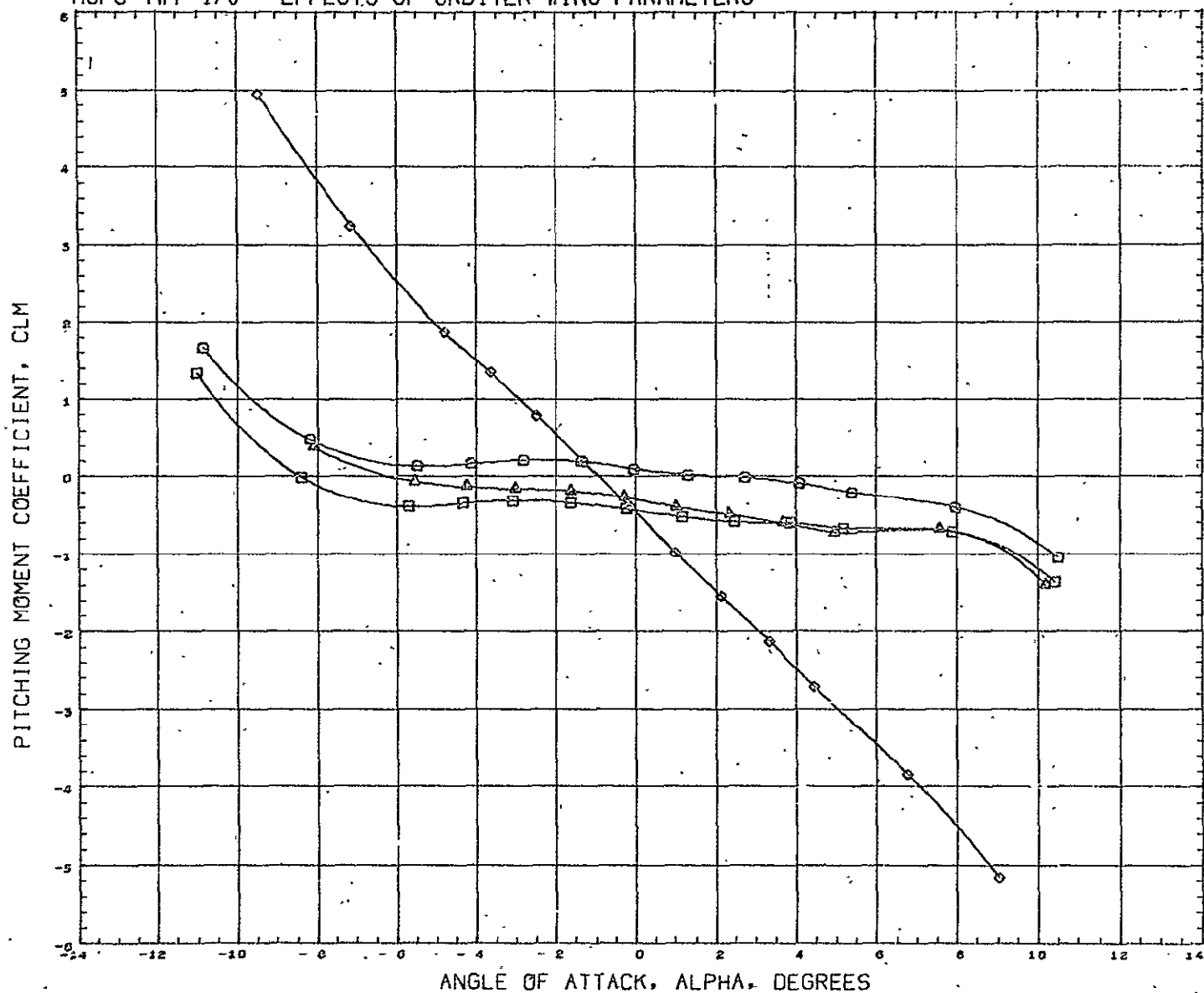
MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS



DATA SET SYMBOL		CONFIGURATION DESCRIPTION	PARAMETRIC VALUES				REFERENCE INFORMATION	
(D24001)	○	TWT470 S-IC/GAC ORBITER BFLOWHVS BASIC	BETA	- 0.050	ORBINC	- 1.050	REFS	1.3960 SQ. IN.
(D24161)	□	TWT470 S-IC/GAC ORBITER BFLOWHVS WING SPOILERS	WNSINC	- 4.000	HTAIL	0.000	REFL	1.3330 INCHES
			PHIB	0.000			REFB	1.3330 INCHES
							XHRP	5.2640 INCHES
							YHRP	0.0000 INCHES
							ZHRP	0.0000 INCHES
							SCALE	0.3366 PERCENT

MACH 0.699

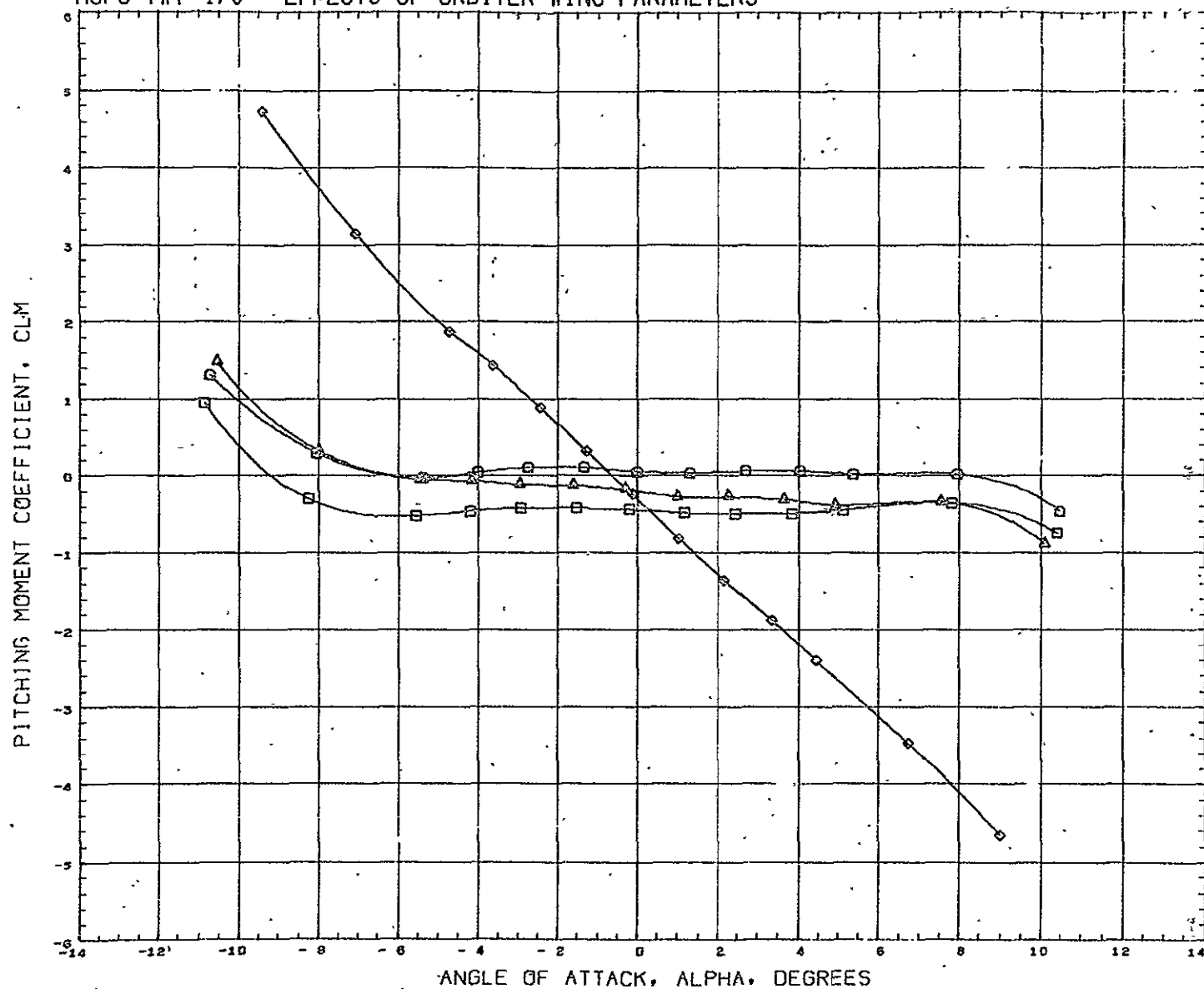
MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS



DATA KEY SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(E24001)	TWT470 S-1C/GAC ORBITER BF10HVS BASIC	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ. IN.
(E24141)	TWT470 S-1C/GAC ORBITER BF10HVS WING INC = 2	WINGINC 4.000 HTAIL 0.000	REFL 1.3330 INCHES
(E24111)	TWT470 S-1C/GAC ORBITER BF10HVS WING OFF	PHIB 0.000	REFB 1.3330 INCHES
(E24161)	TWT470 S-1C/GAC ORBITER BF10HVS WING SPOILERS		XMRP 5.2640 INCHES
			YNRP 0.0000 INCHES
			ZNRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 0.997

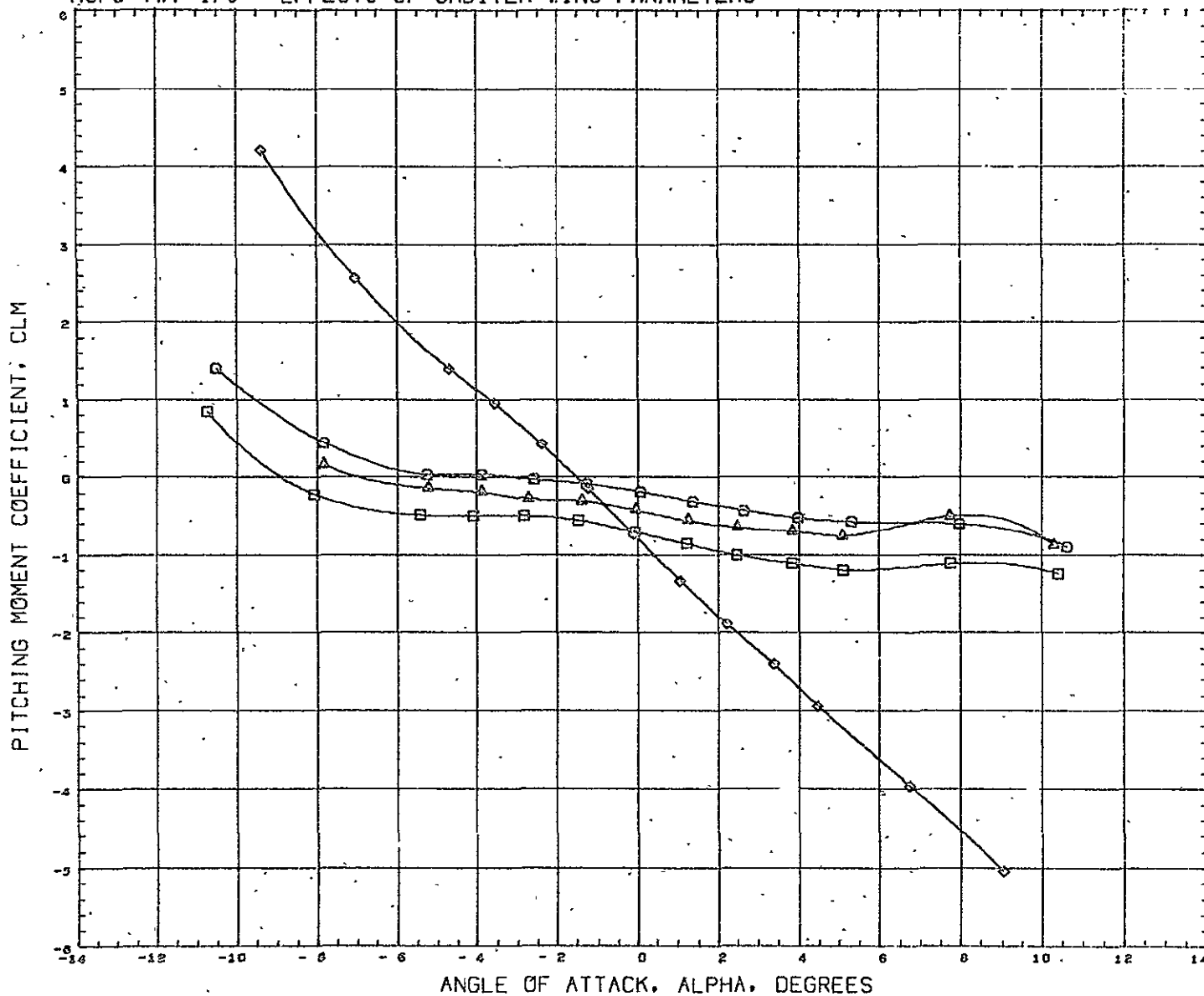
MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(E24081)	TWT470 S-IC/GAC ORBITER BF10HVS BASIC.	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ. IN.
(E24141)	TWT470 S-IC/GAC ORBITER BF10HVS WING INC = 2	WNGINC 4.000 HTAIL 0.000	REFL 1.3330 INCHES
(E24111)	TWT470 S-IC/GAC ORBITER BF10HVS WING OFF		REFB 1.3330 INCHES
(E24161)	TWT470 S-IC/GAC ORBITER BF10HVS WING SPOILERS	PHIB 0.000	XNRP 5.2640 INCHES
			YNRP 0.0000 INCHES
			ZNRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

HACH 1.095

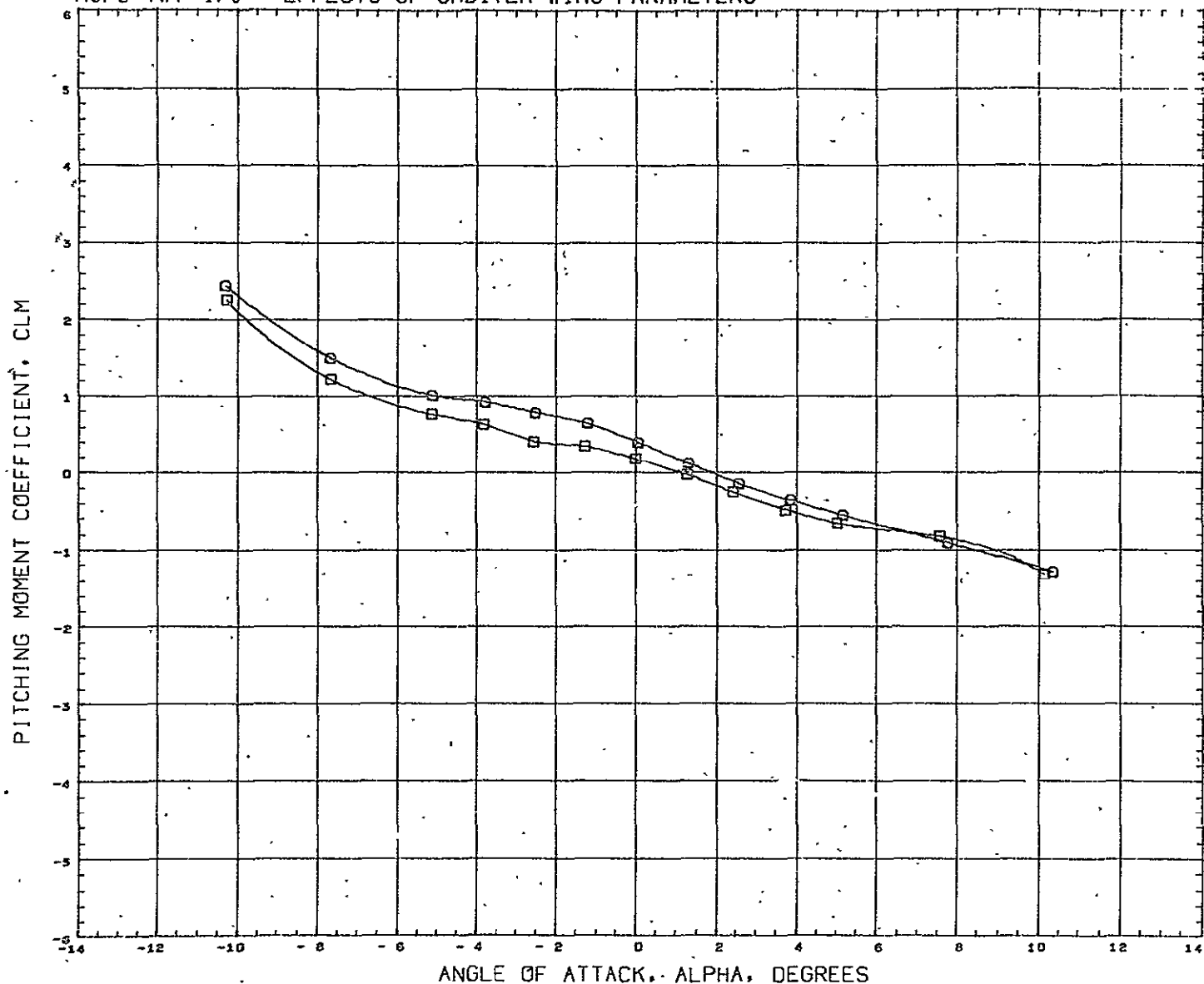
MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(E24081)	TWT470 S-1C/GAC ORBITER BF10HVS BASIC	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ. IN.
(E24141)	TWT470 S-1C/GAC ORBITER BF10HVS WING INC = 2	WNGINC 4.000 HTAIL 0.000	REFL 1.3330 INCHES
(E24111)	TWT470 S-1C/GAC ORBITER BF10HVS WING OFF	PHIB 0.000	REFB 1.3330 INCHES
(E24161)	TWT470 S-1C/GAC ORBITER BF10HVS WING SPOILERS		XNRP 5.2640 INCHES
			YNRP 0.0000 INCHES
			ZMRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 1.195

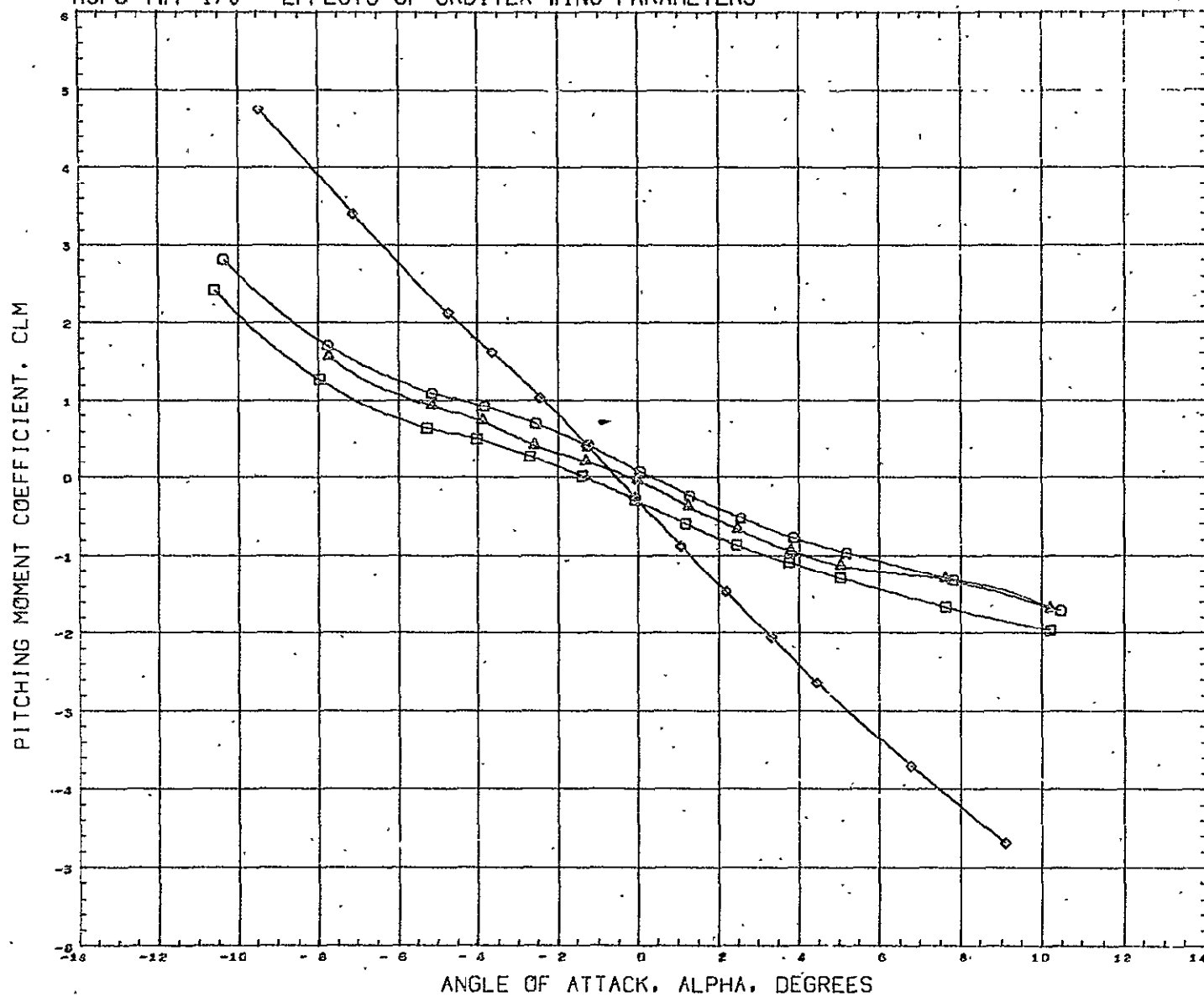
MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS



DATA SET SYMBOL		CONFIGURATION DESCRIPTION	PARAMETRIC VALUES				REFERENCE INFORMATION	
(F24081)	○	TWT470 S-IC/GAC ORBITER BF10WHVS BASIC	BETA	- 0.050	ORBINC	- 1.050	REFS	1.3960 SQ. IN.
(F24161)	□	TWT470 S-IC/GAC ORBITER BF10WHVS WING SPOILERS	WNGINC	4.000	HTAIL	0.000	REFL	1.3330 INCHES
			FHIS	0.000			REFB	1.3330 INCHES
							XNRP	5.2640 INCHES
							YNRP	0.0000 INCHES
							ZNRP	0.0000 INCHES
							SCALE	0.3366 PERCENT

MACH 1.303

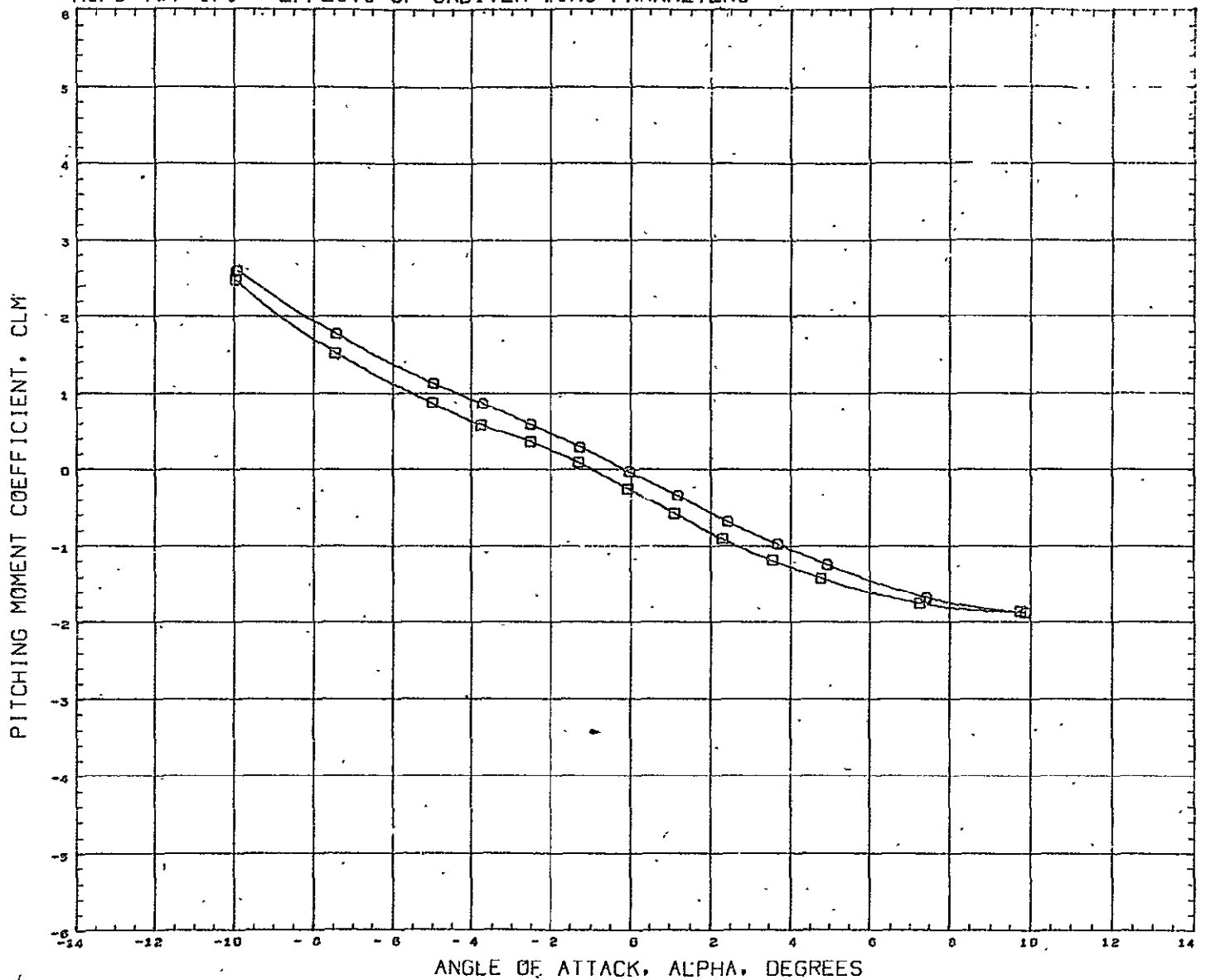
MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(G24081)	TWT470 S-1C/GAC ORBITER BF10WHVS BASIC	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ. IN.
(G24141)	TWT470 S-1C/GAC ORBITER BF10WHVS WING INC = 2	WNGINC 4.000 HTAIL 0.000	REFL 1.3330 INCHES
(G24111)	TWT470 S-1C/GAC ORBITER BF10WHVS WING OFF		REFB 1.3330 INCHES
(G24161)	TWT470 S-1C/GAC ORBITER BF10WHVS WING SPOILERS	FHIB 0.000	XHRP 5.2640 INCHES
			YHRP 0.0000 INCHES
			ZHRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 1.458

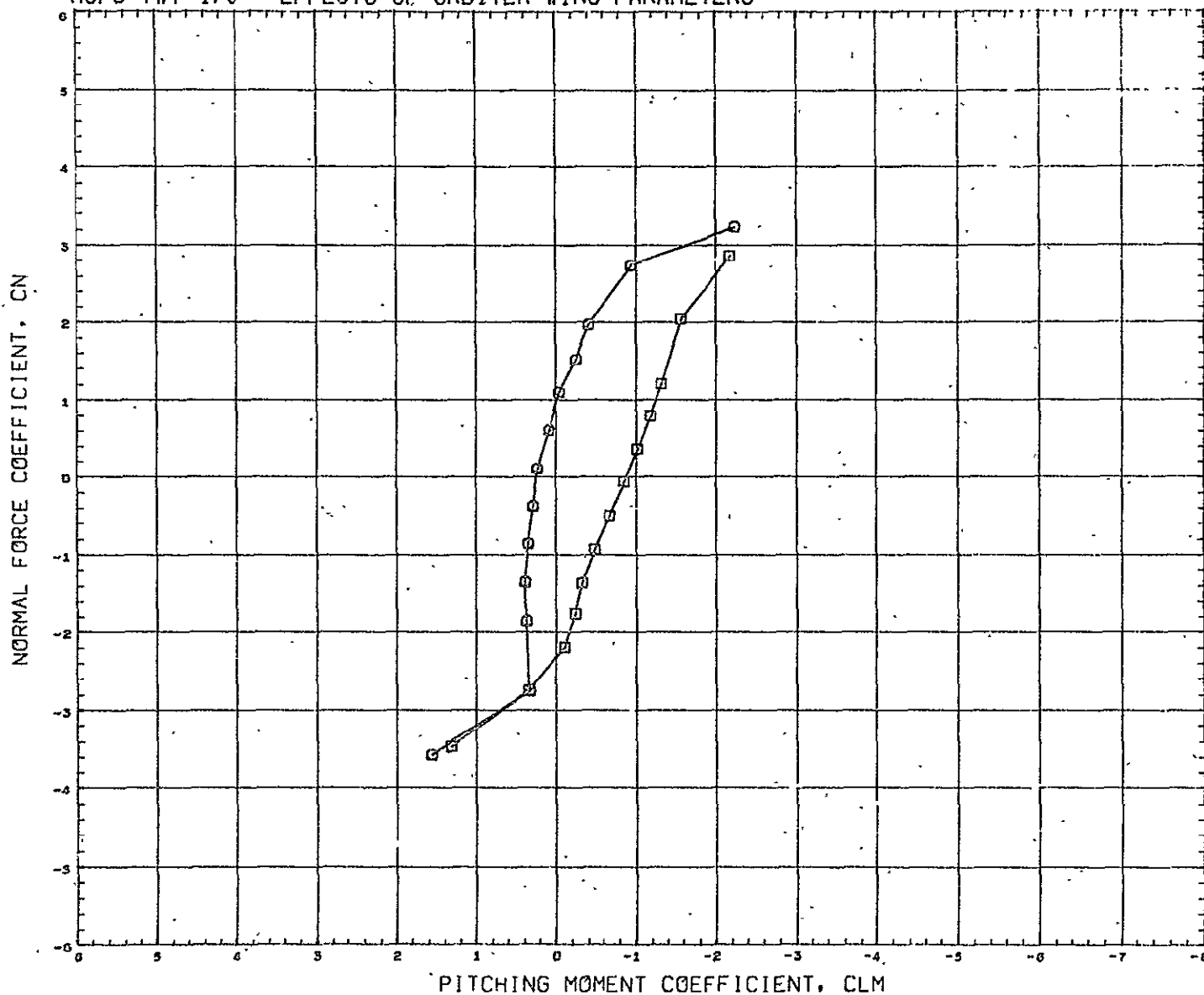
MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS



DATA SET SYMBOL		CONFIGURATION DESCRIPTION	PARAMETRIC VALUES				REFERENCE INFORMATION	
(824081)	○	TWT470 S-1C/GAC ORBITER BF10WHVS BASIC	BETA	- 0.050	ORBINC	- 1.050	REFS	1.3960 SQ. IN.
(824161)	□	TWT470 S-1C/GAC ORBITER BF10WHVS WING SPOILERS	WNGINC	4.000	HTAIL	0.000	REFL	1.3330 INCHES
			PHIB	0.000			REFB	1.3330 INCHES
							XHRF	5.2640 INCHES
							YHRF	0.0000 INCHES
							ZHRF	0.0000 INCHES
							SCALE	0.3366 PERCENT

MACH 1.967

MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS



DATA KEY SYMBOL CONFIGURATION DESCRIPTION

(D24081) ○ TWT470 S-1C/GAC ORBITER BF10WHVS BASIC
(D24161) □ TWT470 S-1C/GAC ORBITER BF10WHVS WING SPOILERS

PARAMETRIC VALUES

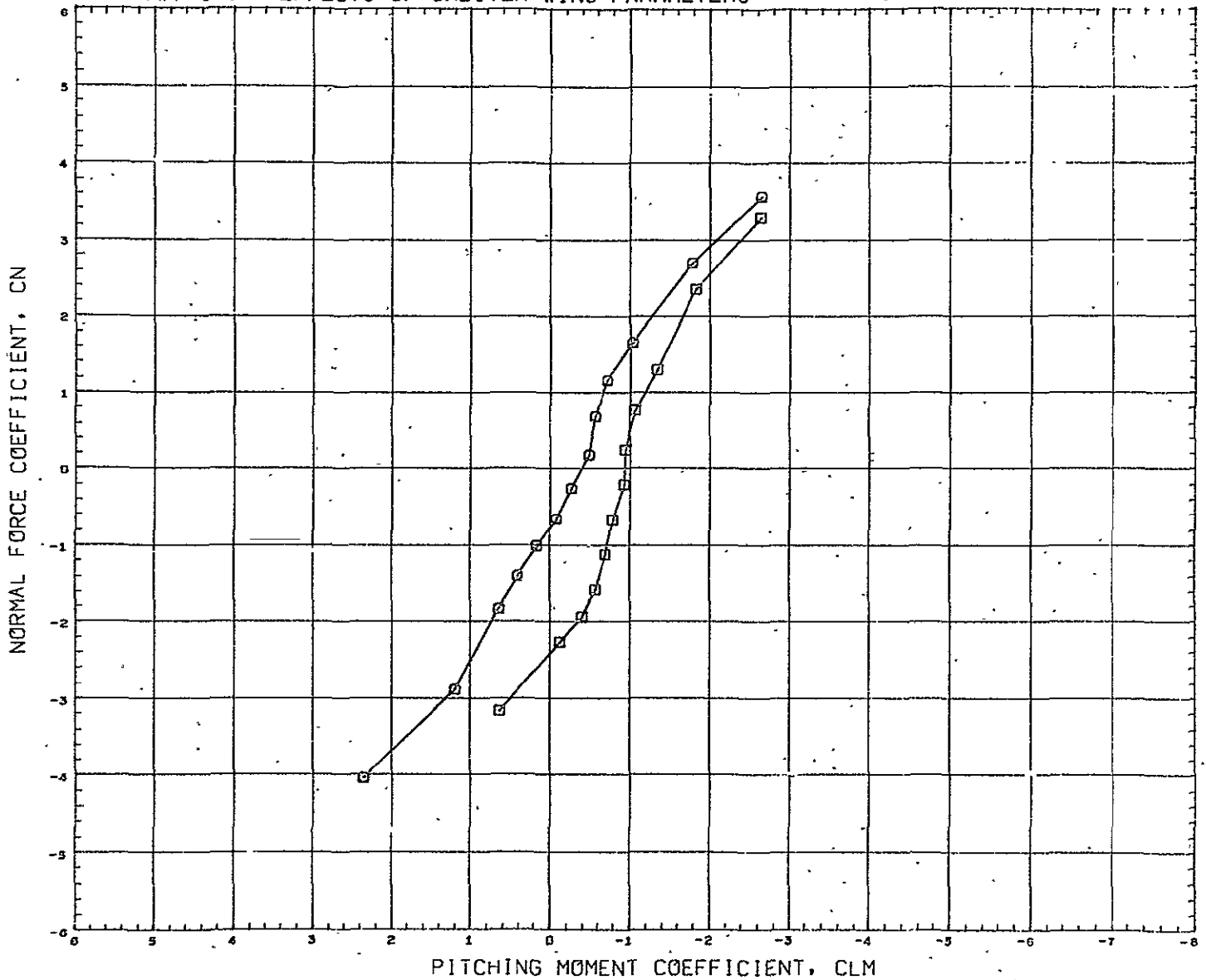
BETA - 0.050 ORBINC - 1.050
WINGINC 4.000 HTAIL 0.000
PHIB 0.000

REFERENCE INFORMATION

REFS 1.3960 SQ. IN.
REFL 1.3330 INCHES
REFB 1.3330 INCHES
XHRP 5.2640 INCHES
YHRP 0.0000 INCHES
ZHRP 0.0000 INCHES
SCALE 0.3366 PERCENT

HACH 0.599

MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(D24081) □ TWT470 S-IC/GAC ORBITER BFLOWHVS BASIC
(D24161) □ TWT470 S-IC/GAC ORBITER BFLOWHVS WING SPOILERS

PARAMETRIC VALUES

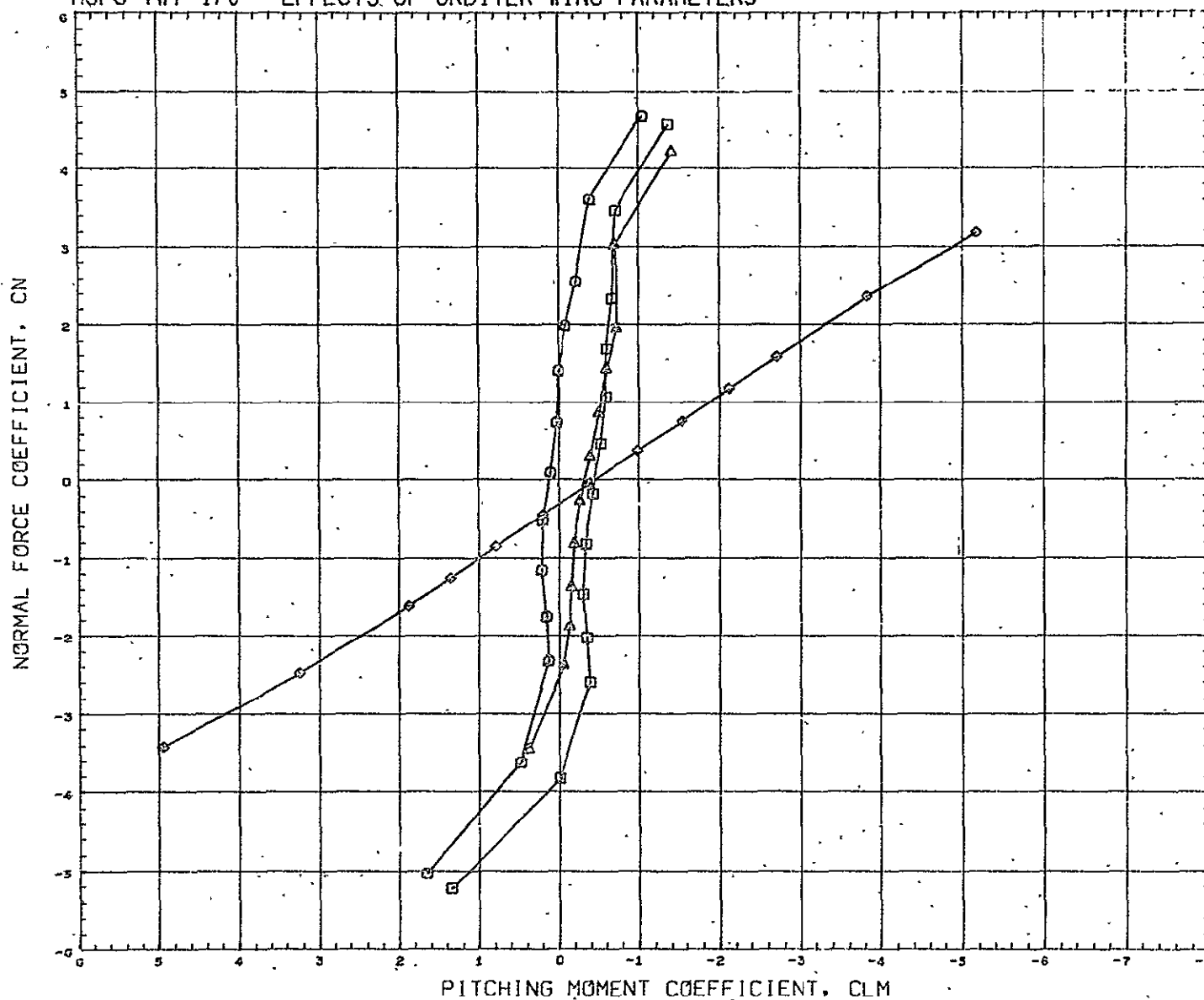
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WNGINC 4.000 HTAIL 0.000
PHIB 0.000

REFERENCE INFORMATION

REFS 1.3960 SQ. IN.
REFL 1.3330 INCHES
REFB 1.3330 INCHES
XMRP 5.2640 INCHES
YMRP 0.0000 INCHES
ZMRP 0.0000 INCHES
SCALE 0.3366 PERCENT

MACH 0.699

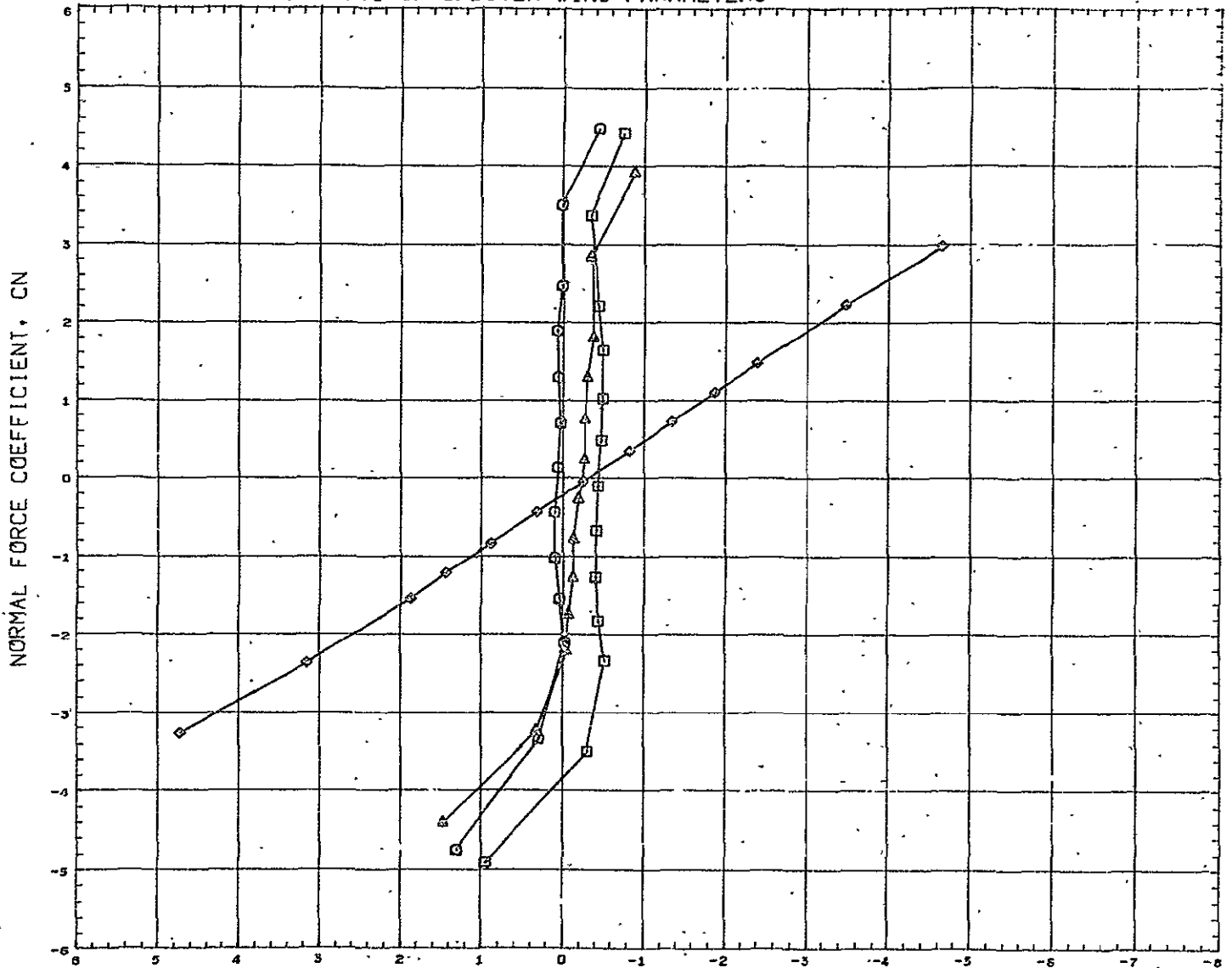
MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(E24001)	TWT470 S-1C/GAC ORBITER BF10HVS BASIC	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ. IN.
(E24141)	TWT470 S-1C/GAC ORBITER BF10HVS WING INC = 2	WNGINC 4.000 NTAIL 0.000	REFL 1.3330 INCHES
(E24111)	TWT470 S-1C/GAC ORBITER BF10HVS WING OFF	PHIB 0.000	REFB 1.3330 INCHES
(E24161)	TWT470 S-1C/GAC ORBITER BF10HVS WING SPOILERS		XMRP 5.2640 INCHES
			YMRP 0.0000 INCHES
			ZMRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 0.997

MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(E24081) ○ TWT470 S-IC/GAC ORBITER BF10HVS BASIC
(E24141) □ TWT470 S-IC/GAC ORBITER BF10HVS WING INC = 2
(E24111) ◇ TWT470 S-IC/GAC ORBITER BF10HVS WING OFF
(E24161) △ TWT470 S-IC/GAC ORBITER BF10HVS WING SPOILERS

PARAMETRIC VALUES

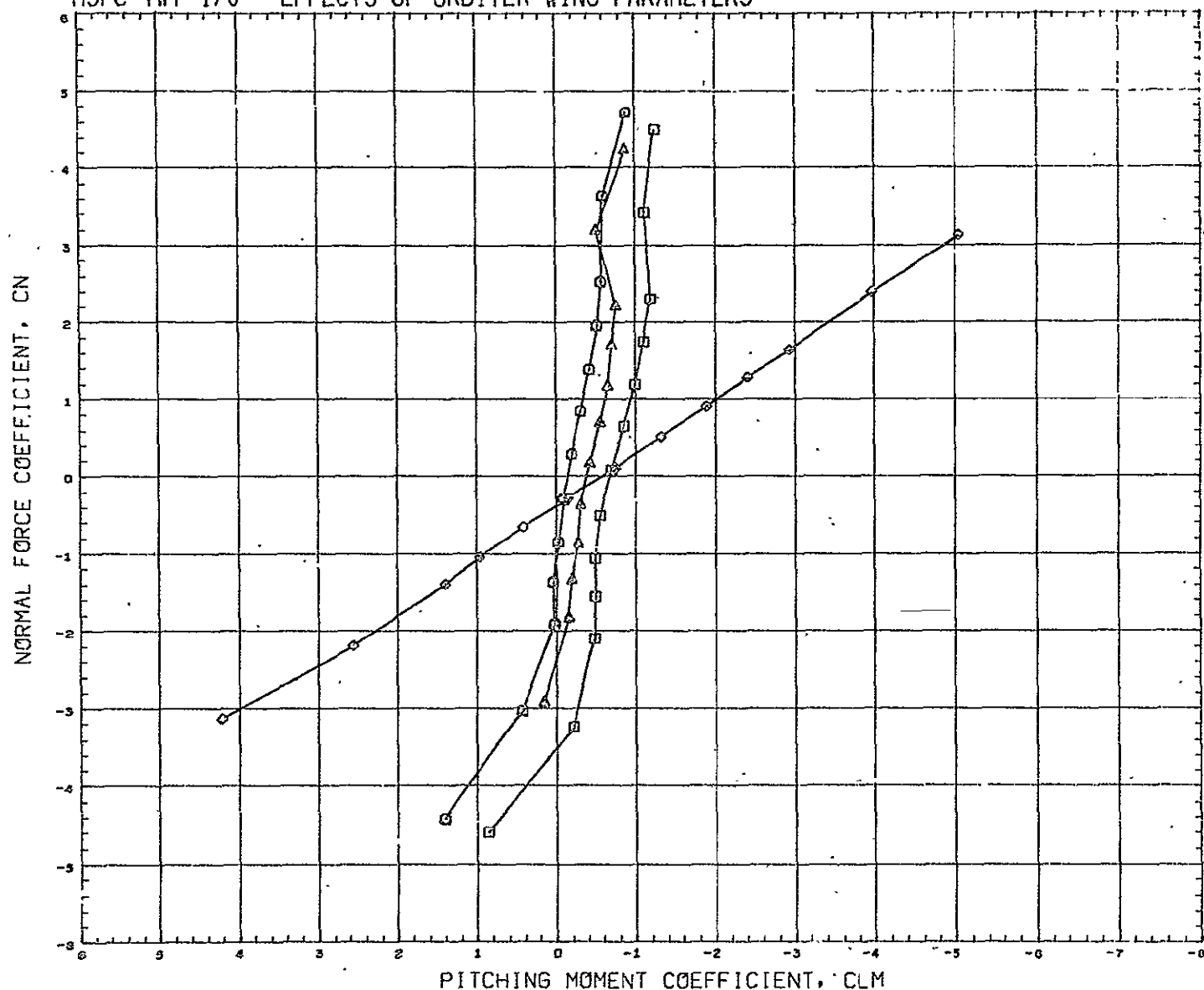
BETA - 0.050 ORBINC - 1.050
WNGINC 4.000 HTAIL 0.000
PHIB 0.000

REFERENCE INFORMATION

REFS 1.3960 SQ. IN.
REFL 1.3330 INCHES
REFB 1.3330 INCHES
XMRP 5.2640 INCHES
YMRP 0.0000 INCHES
ZMRP 0.0000 INCHES
SCALE 0.3366 PERCENT

MACH 1.095

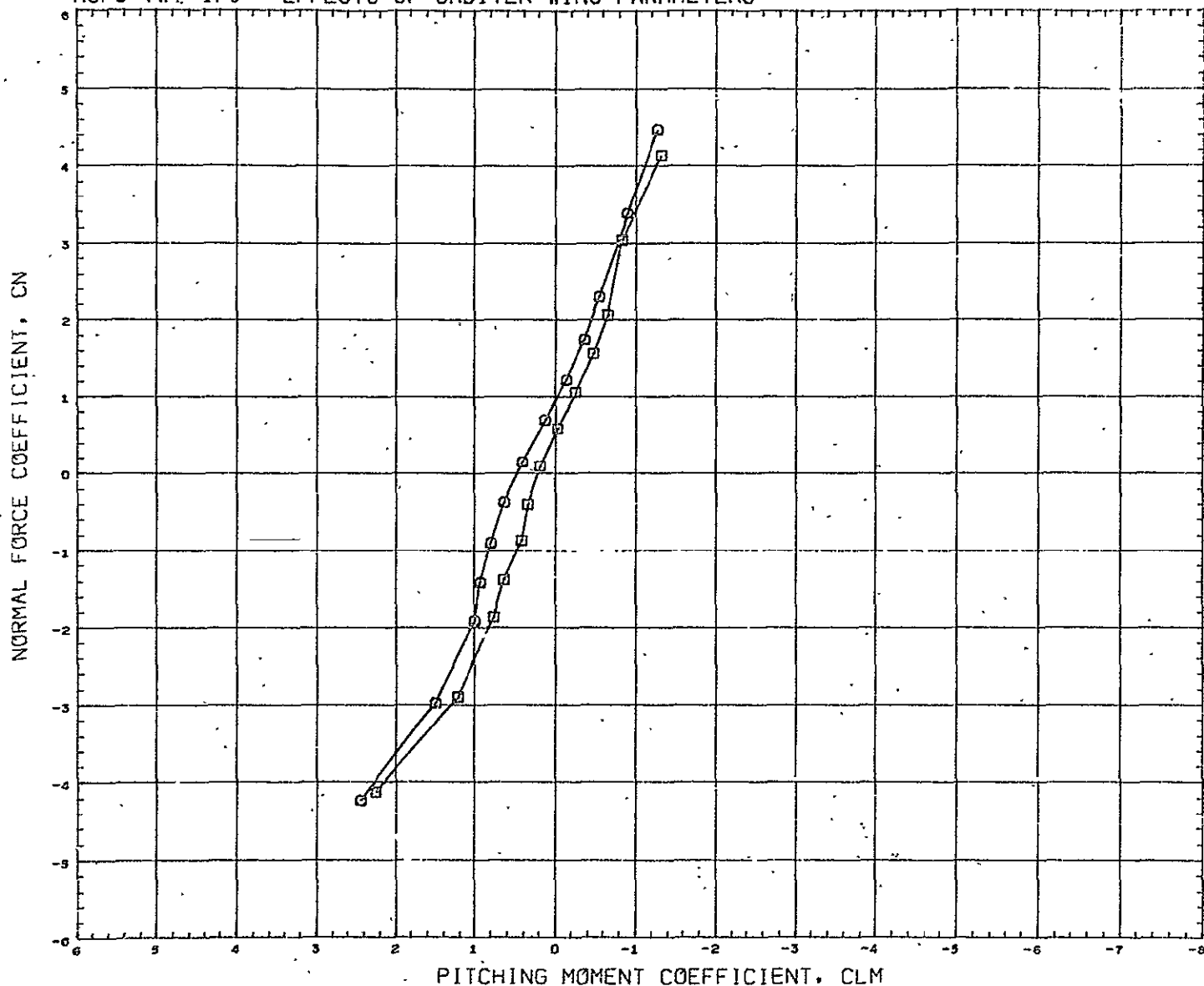
MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(E24081)	TWT470 S-1C/GAC ORBITER BF10HVS BASIC	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ.IN.
(E24141)	TWT470 S-1C/GAC ORBITER BF10HVS WING INC = 2	WNGINC 4.000 HTAIL J.000	REFL 1.3330 INCHES
(E24151)	TWT470 S-1C/GAC ORBITER BF10HVS WING OFF	PHIB 0.000	REFB 1.3330 INCHES
(E24161)	TWT470 S-1C/GAC ORBITER BF10HVS WING SPOILERS		XHRP 5.2640 INCHES
			YHRP 0.0000 INCHES
			ZHRP 0.0000 INCHES
			SCALE 0.3366 PERCN

HACH 5.195

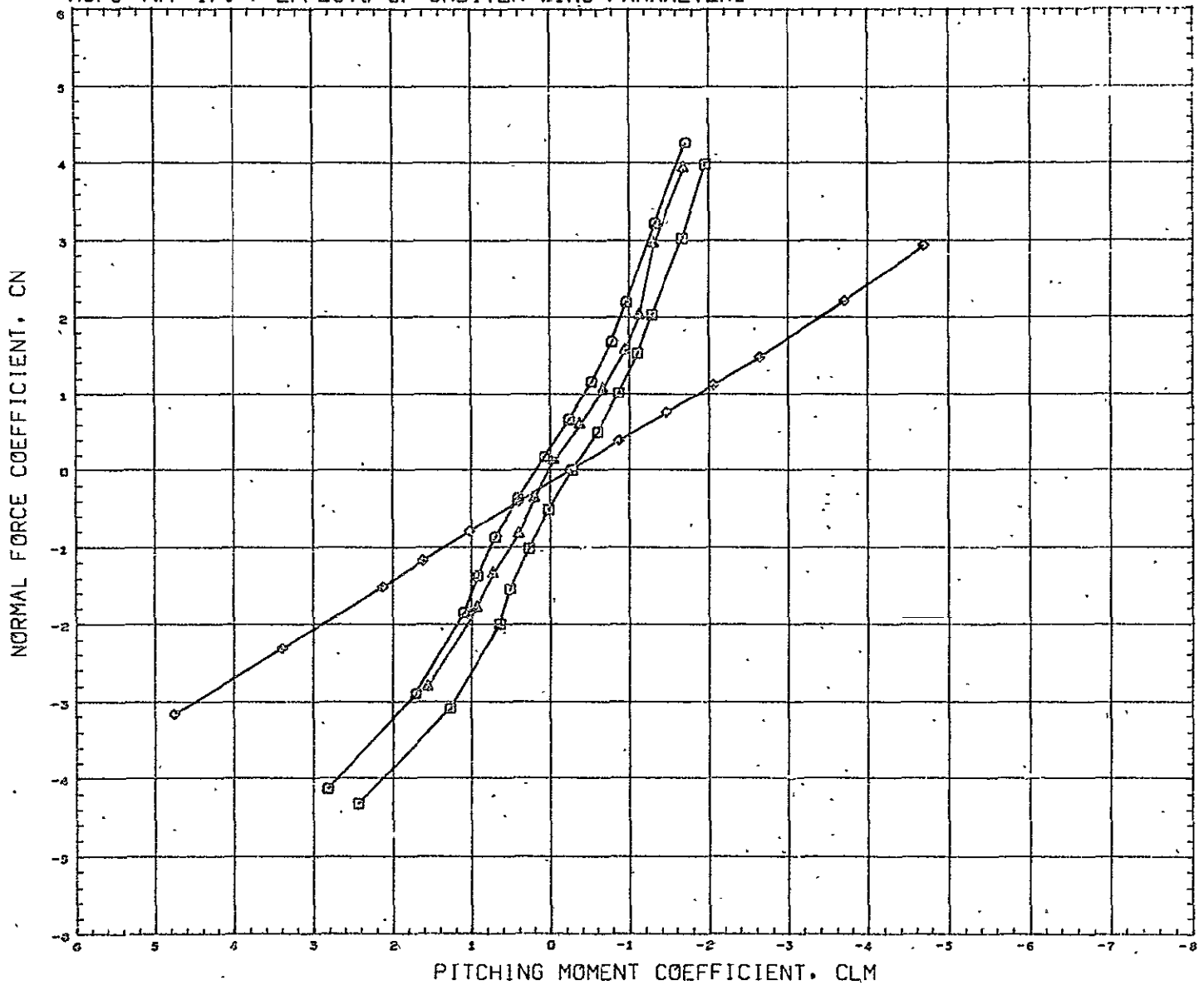
MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS



DATA SET SYMBOL		CONFIGURATION DESCRIPTION	PARAMETRIC VALUES				REFERENCE INFORMATION	
(F24081)	○	TWT470 S-IC/GAC ORBITER BFLOWHVS BASIC	BETA	- 0.050	ORBINC	- 1.050	REFS	1.3960 SQ. IN.
(F24161)	□	TWT470 S-IC/GAC ORBITER BFLOWHVS WING SPOILERS	WNGINC	4.000	HTAIL	0.000	REFL	1.3330 INCHES
			PHIB	0.000			REFB	1.3330 INCHES
							XHRP	5.2640 INCHES
							YHRP	0.0000 INCHES
							ZHRP	0.0000 INCHES
							SCALE	0.3366 PERCENT

MACH 1.303

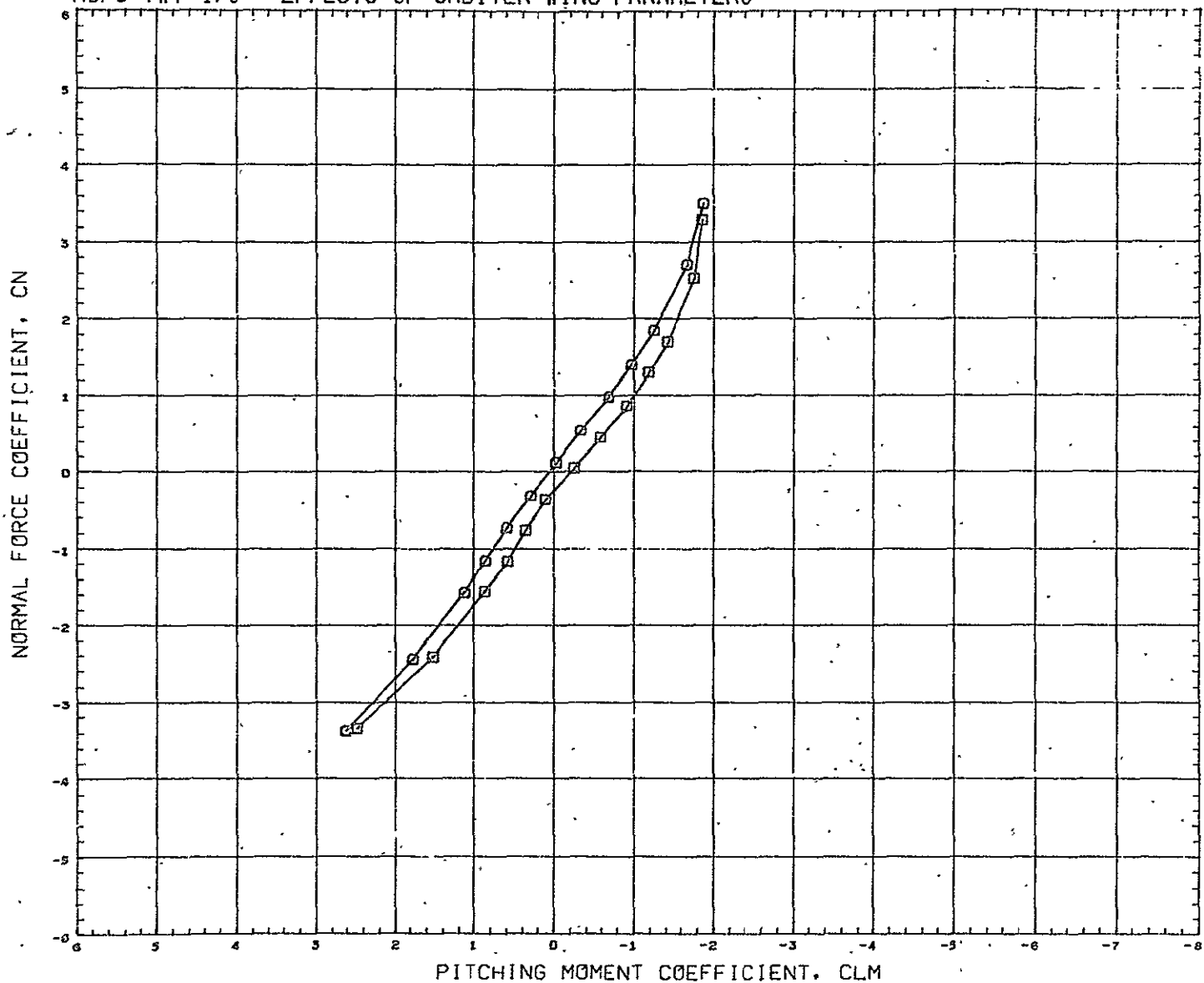
MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(624001)	TWT470 S-IC/GAC ORBITER BF10WHVS BASIC	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ. IN.
(624101)	TWT470 S-IC/GAC ORBITER BF10WHVS WING INC = 2	WNGINC 4.000 HTAIL 0.000	REFL 1.3330 INCHES
(624111)	TWT470 S-IC/GAC ORBITER BF10HVS WING OFF	PHIB 0.000	REFB 1.3330 INCHES
(624101)	TWT470 S-IC/GAC ORBITER BF10WHVS WING SPOILERS		XNRP 5.2640 INCHES
			YNRP 0.0000 INCHES
			ZNRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 1.456

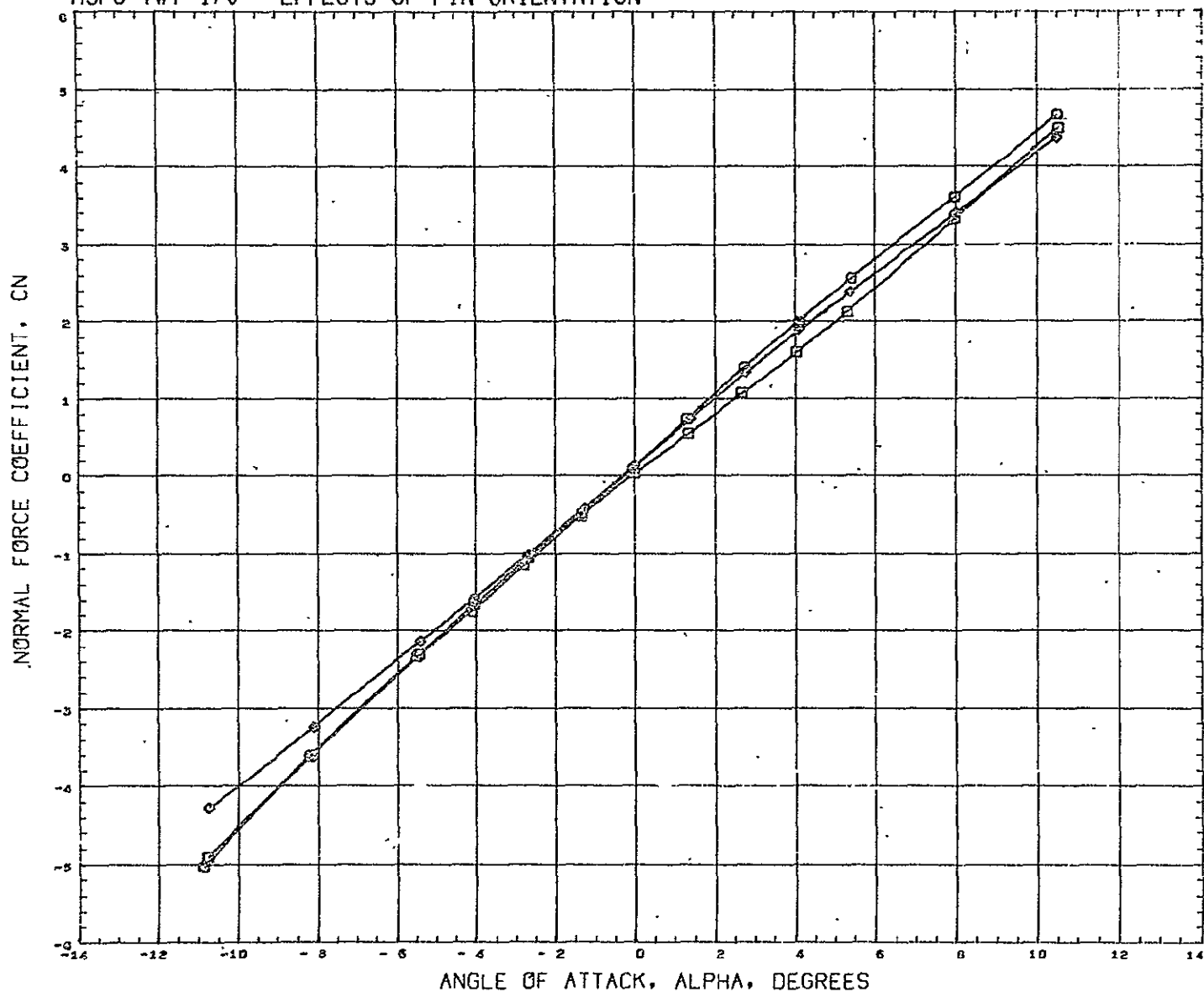
MSFC TWT 470 EFFECTS OF ORBITER WING PARAMETERS



DATA SET SYMBOL		CONFIGURATION DESCRIPTION		PARAMETRIC VALUES				REFERENCE INFORMATION	
(324001)	○	TWT470 S-1C/CAC ORBITER BF10WHVS	BASIC	BETA	0.050	ORBINC	1.050	REFS	1.3960 SQ. IN.
(324161)	□	TWT470 S-1C/CAC ORBITER BF10WHVS	WING SPOILERS	WNGINC	4.000	HTAIL	0.000	REFL	1.3330 INCHES
				PHIB	0.000			REFB	1.3330 INCHES
								XMRP	5.2640 INCHES
								YMRP	0.0000 INCHES
								ZMRP	0.0000 INCHES
								SCALE	0.3366 PERCNT

MACH 1.967

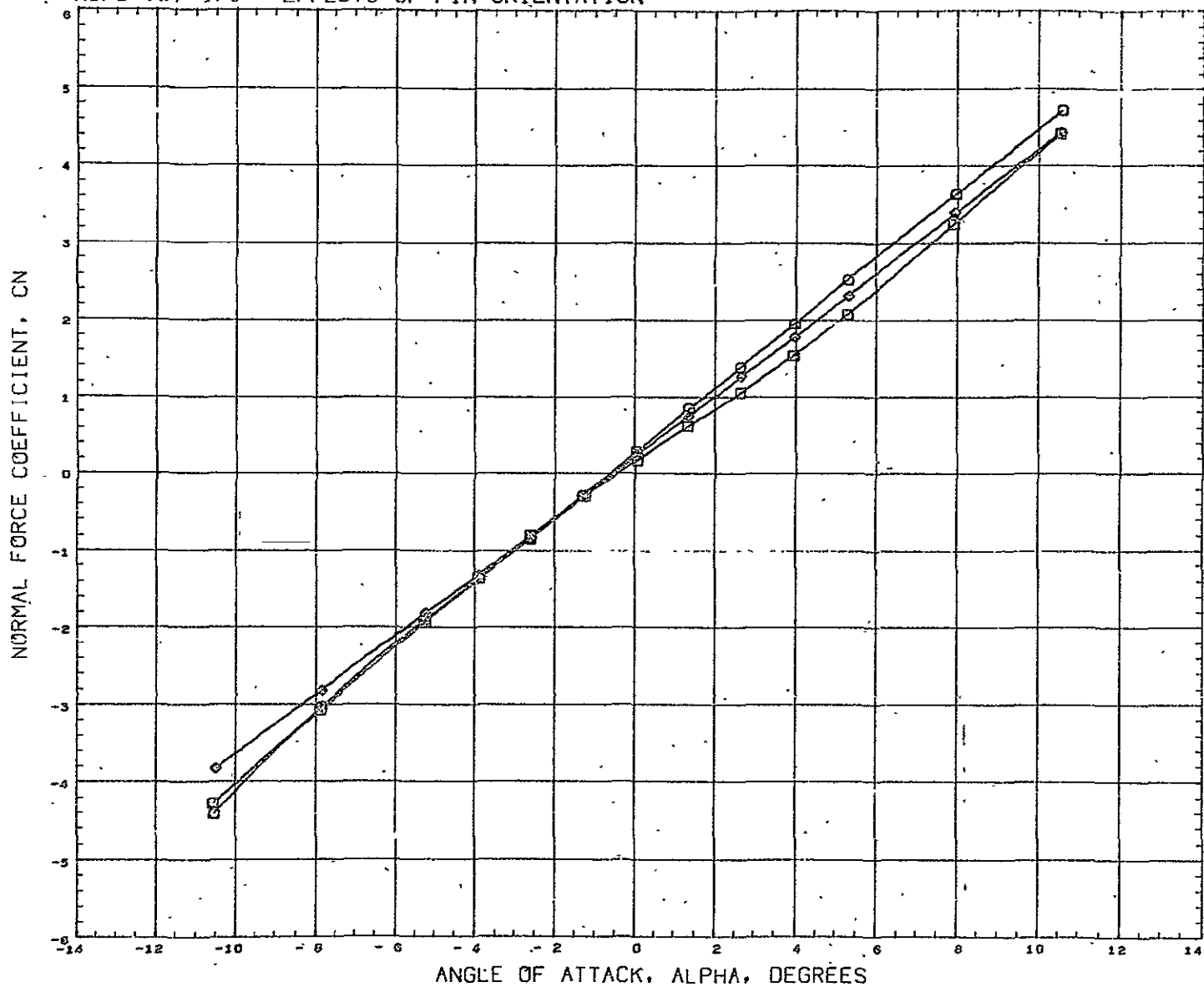
MSFC TWT 470 EFFECTS OF FIN ORIENTATION



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(Y24061)	TWT470 S-1C/GAC ORBITER BF10WHV5 BASIC	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ. IN.
(A24121)	TWT470 S-1C/GAC ORBITER BF20WHV5 PHIB = 45	WINGINC 4.000 HTAIL 0.000	REFL 1.3330 INCHES
(A24131)	TWT470 S-1C/GAC ORBITER BF20WHV5 PHIB = 0	PHIB 0.000	REFB 1.3330 INCHES
			XHRP 5.2640 INCHES
			YHRP 0.0000 INCHES
			ZHRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 0.997

MSFC TWT 470 EFFECTS OF FIN ORIENTATION



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(T24D51) S-IC/GAC ORBITER BF10WHYS BASIC
(A24121) S-IC/GAC ORBITER BF20WHYS PHIB = 45
(A24131) S-IC/GAC ORBITER BF20WHYS PHIB = 0

PARAMETRIC VALUES

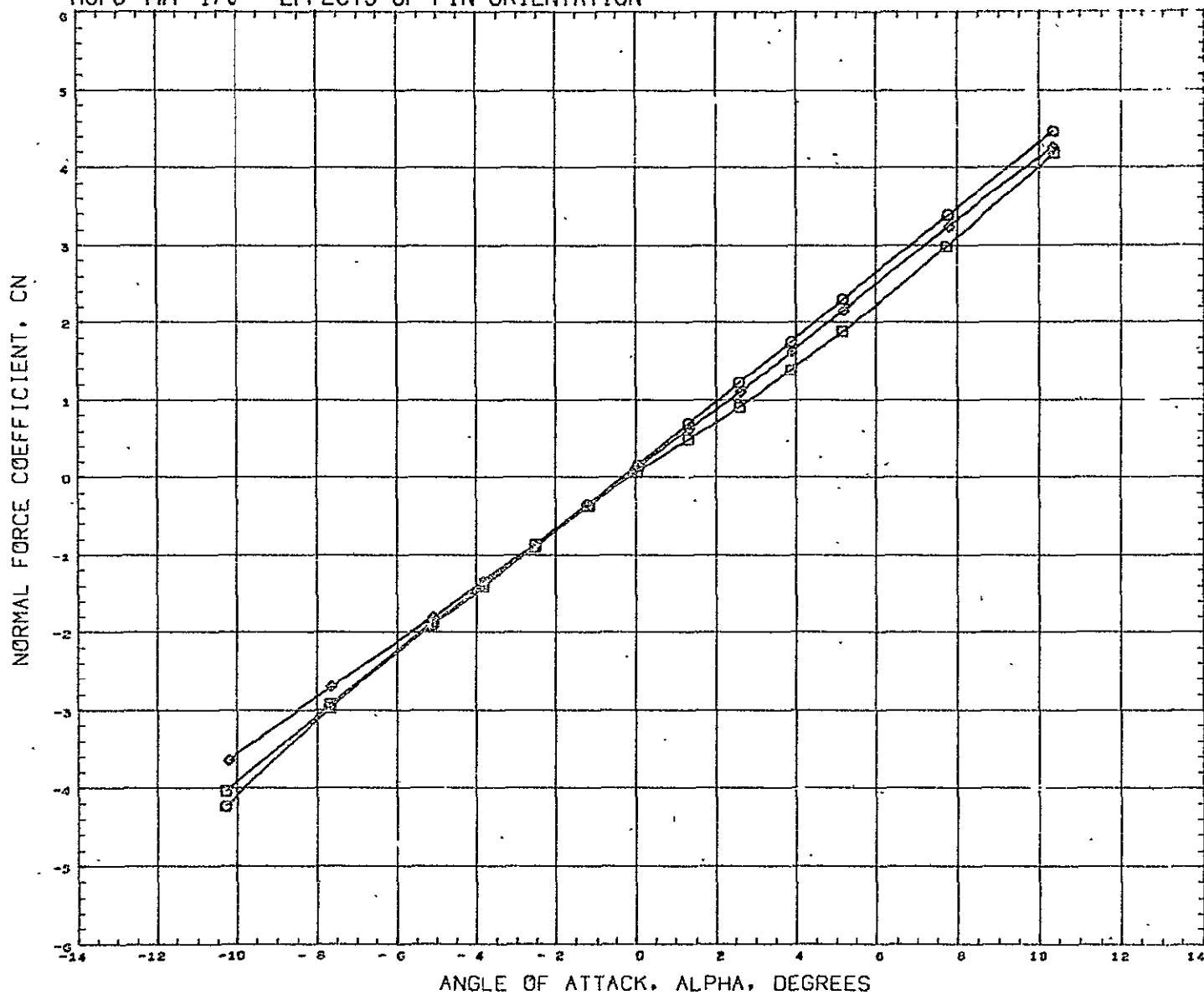
BETA - 0.050 ORBINC - 1.050
WINGINC 4.000 HTAIL 0.000
PHIB 0.000

REFERENCE INFORMATION

REFS 1.3960 SQ. IN.
REFL 1.3330 INCHES
REFB 1.3330 INCHES
XMRP 5.2640 INCHES
YMRP 0.0000 INCHES
ZMRP 0.0000 INCHES
SCALE 0.3366 PERCENT

MACH 1.193

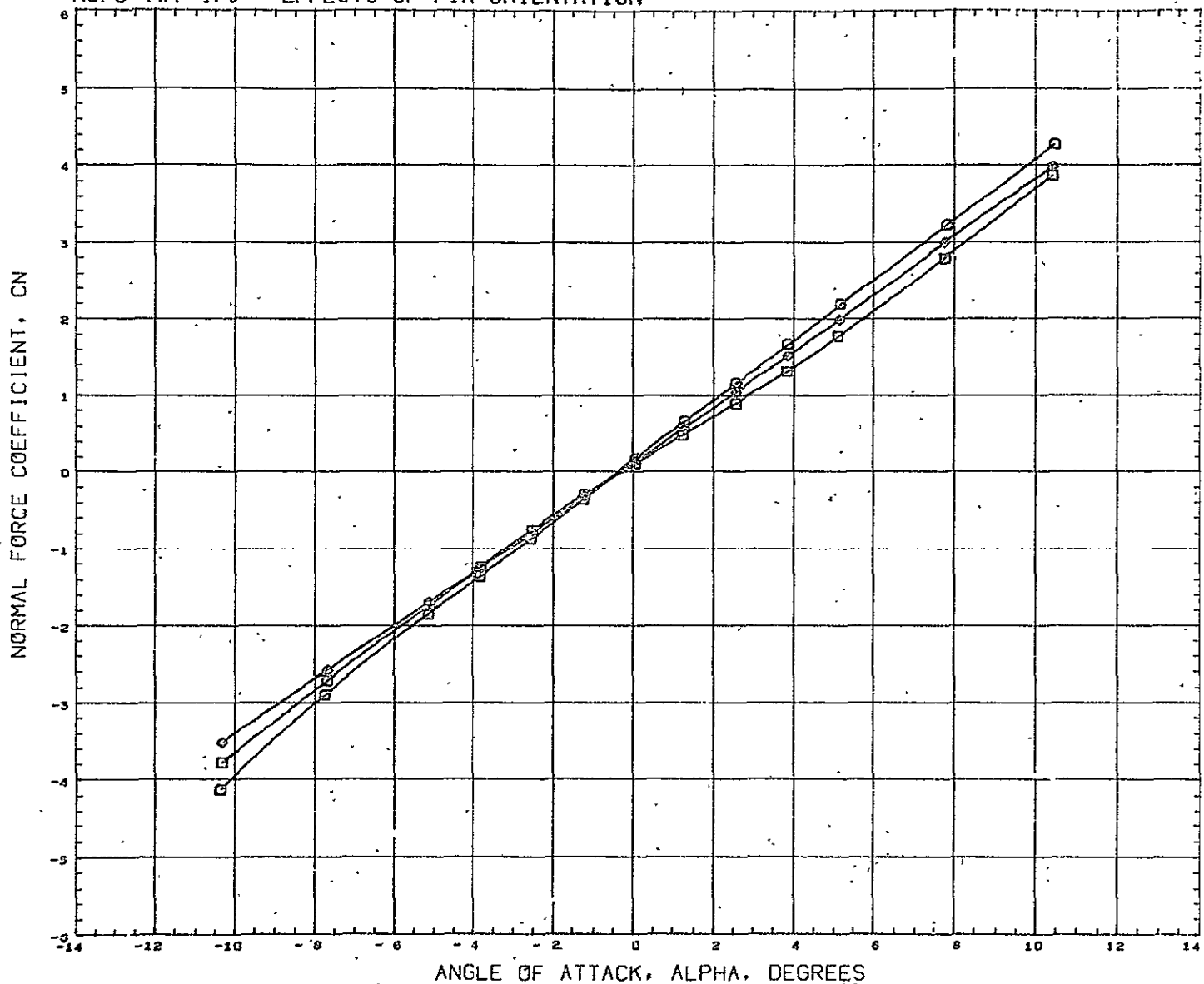
MSFC TWT 470 EFFECTS OF FIN ORIENTATION



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(T26001)	TWT470 S-IC/GAC ORBITER BF10WHVS BASIC	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ. IN.
(A26121)	TWT470 S-IC/GAC ORBITER BF20WHVS PHIB = 45	WINGINC 4.000 HTAIL 0.000	REFL 1.3330 INCHES
(A26131)	TWT470 S-IC/GAC ORBITER BF20WHVS PHIB = 0	PHIB 0.000	REFB 1.3330 INCHES
			XHRP 5.2640 INCHES
			YHRP 0.0000 INCHES
			ZHRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 1.303

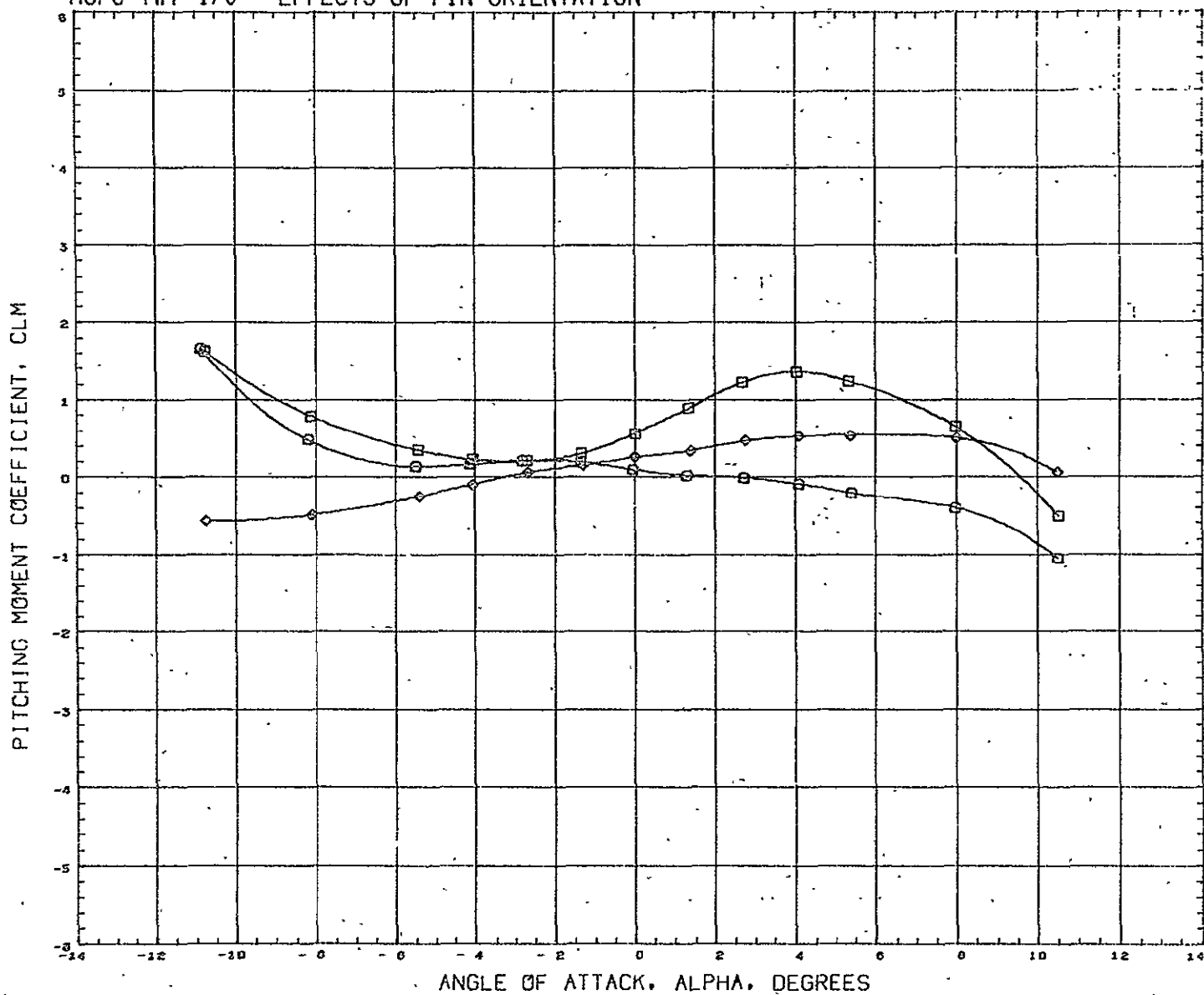
MSFC-TWT 470 EFFECTS OF FIN ORIENTATION



DATA SET SYMBOL		CONFIGURATION DESCRIPTION	PARAMETRIC VALUES				REFERENCE INFORMATION		
(Y24001)	□	TWT470 S-IC/GAC ORBITER BF10WHYS BASIC	BETA	- 0.050	ORBINC	- 1.050	REFS	1.3960	Sq. IN.
(A24121)	□	TWT470 S-IC/GAC ORBITER BF20WHYS PHIB = 45	WNGINC	4.000	HTAIL	0.000	REFL	1.3330	INCHES
(A24131)	◇	TWT470 S-IC/GAC ORBITER BF20WHYS PHIB = 0	PHIB	0.000			REFB	1.3330	INCHES
							XMRP	5.2640	INCHES
							YMRP	0.0000	INCHES
							ZMRP	0.0000	INCHES
							SCALE	0.3366	PERCNT

NACH 1.456

MSFC TWT 470 EFFECTS OF FIN ORIENTATION



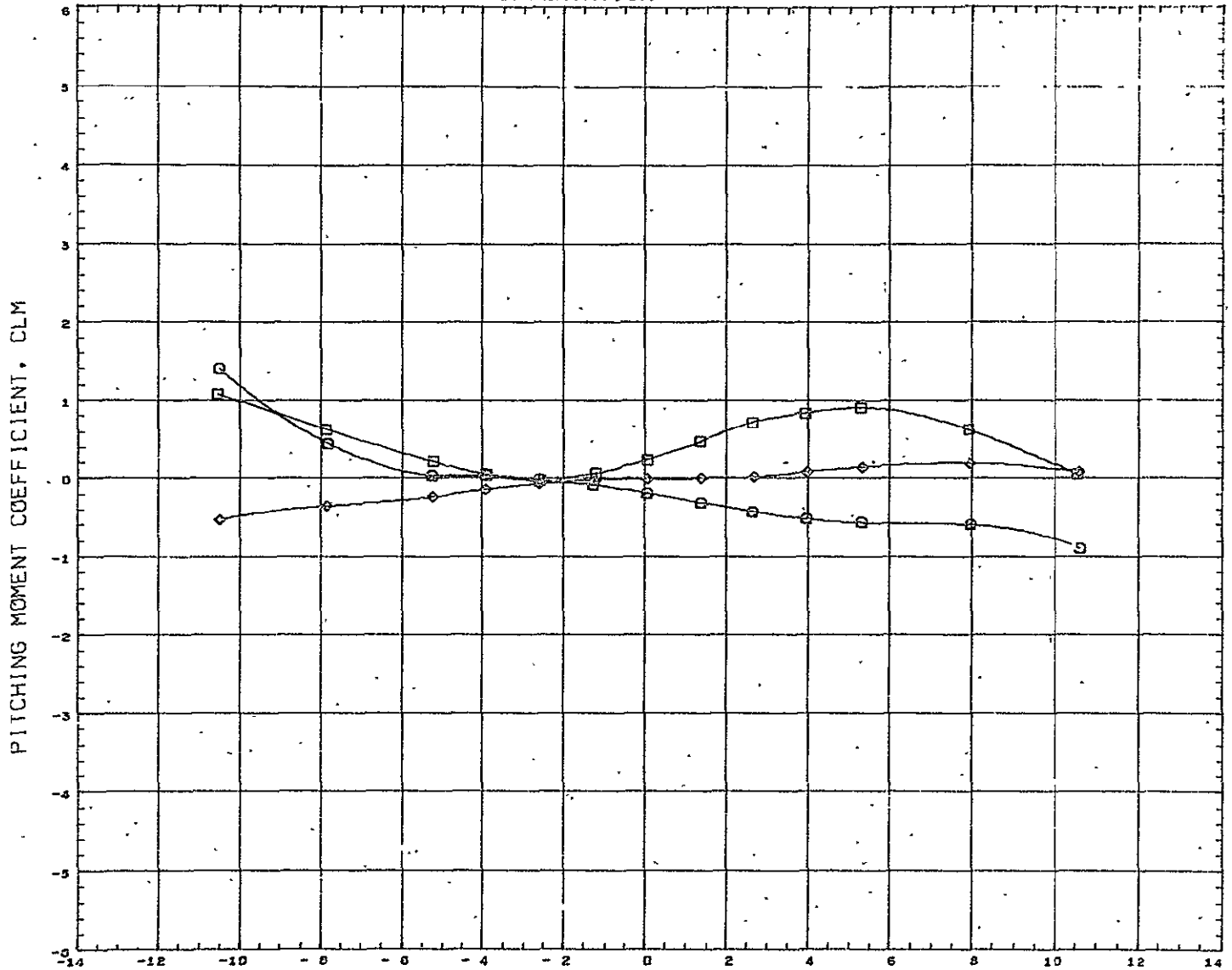
DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(T24001)	□ TWT470 S-1C/GAC ORBITER BF10WHYS BASIC
(A24121)	◇ TWT470 S-1C/GAC ORBITER BF20WHYS FNIB = 45
(A24131)	○ TWT470 S-1C/GAC ORBITER BF20WHYS FNIB = 0

PARAMETRIC VALUES	
BETA	0.050 ORBINC - 1.050
WNGINC	4.000 HTAIL 0.000
FNIB	0.000

REFERENCE INFORMATION	
REFS	1.3960 SQ. IN.
REFL	1.3330 INCHES
REFB	1.3330 INCHES
XHRF	5.2640 INCHES
YHRF	0.0000 INCHES
ZHRF	0.0000 INCHES
SCALE	0.3366 PERCENT

HACH D.997

MSFC TWT 470 EFFECTS OF FIN ORIENTATION

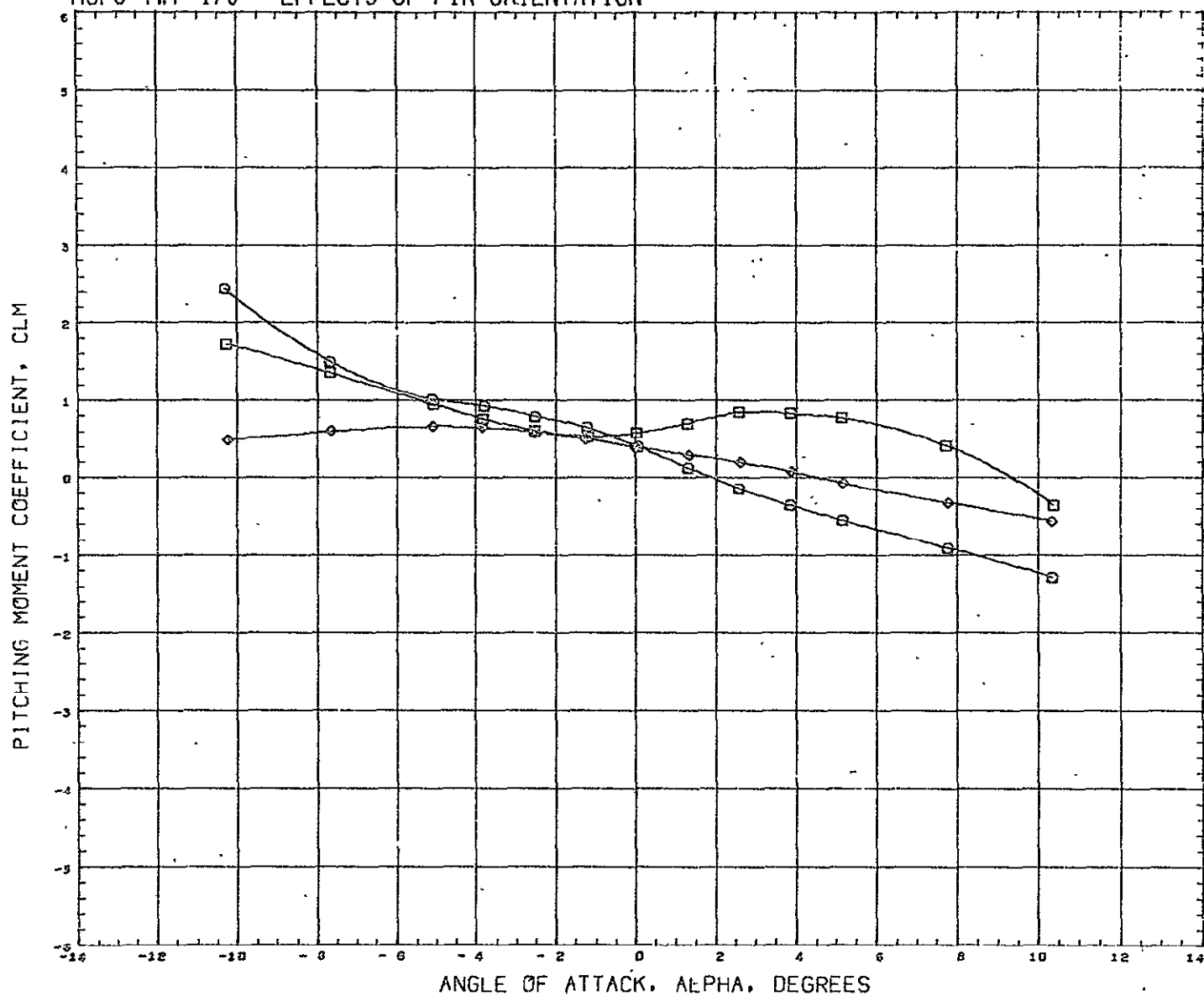


ANGLE OF ATTACK, ALPHA, DEGREES

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(T24001)	TWT470 S-IC/GAC ORBITER BF10WHVS BASIC	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ.IN.
(A24121)	TWT470 S-IC/GAC ORBITER BF20WHVS FHIB = 45	WNGINC .4.000 HTAIL 0.000	REFL 1.3330 INCHES
(A24131)	TWT470 S-IC/GAC ORBITER BF20WHVS FHIB = 0	PHIB 0.000	REFB 1.3330 INCHES
			XHRP 5.2640 INCHES
			YHRP 0.0000 INCHES
			ZHRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 1.195

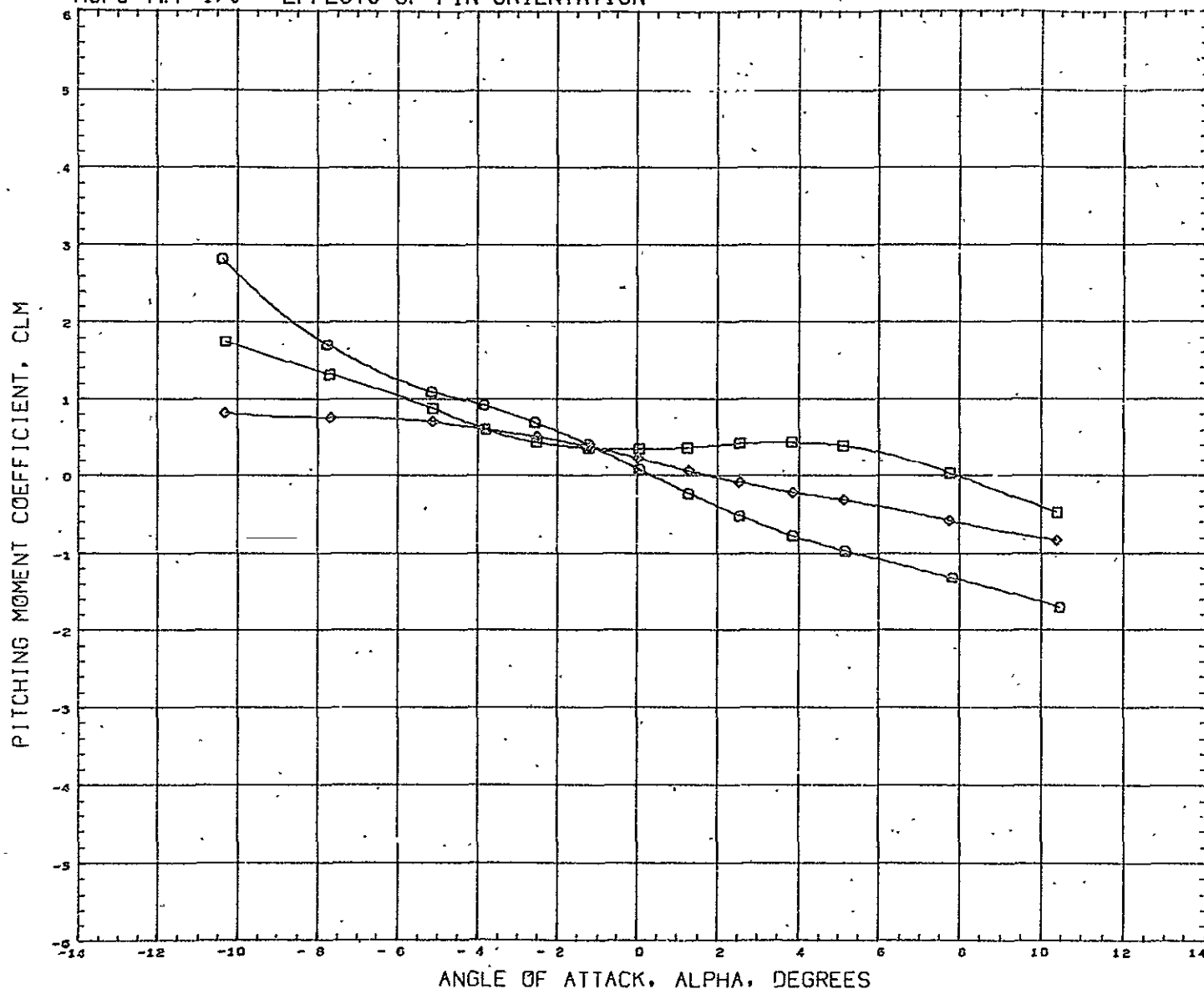
MSFC TWT 470 EFFECTS OF FIN ORIENTATION



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(T24081)	TWT470 S-IC/GAC ORBITER BF10WHVS BASIC	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ. IN.
(A24121)	TWT470 S-IC/GAC ORBITER BF20WHVS PHIB = 45	WNGINC - 4.000 HTAIL 0.000	REFL 1.3330 INCHES
(A24131)	TWT470 S-IC/GAC ORBITER BF20WHVS PHIB = 0	PHIB 0.000	REFB 1.3330 INCHES
			XMRP 5.2640 INCHES
			YMRP 0.0000 INCHES
			ZMRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 1.393

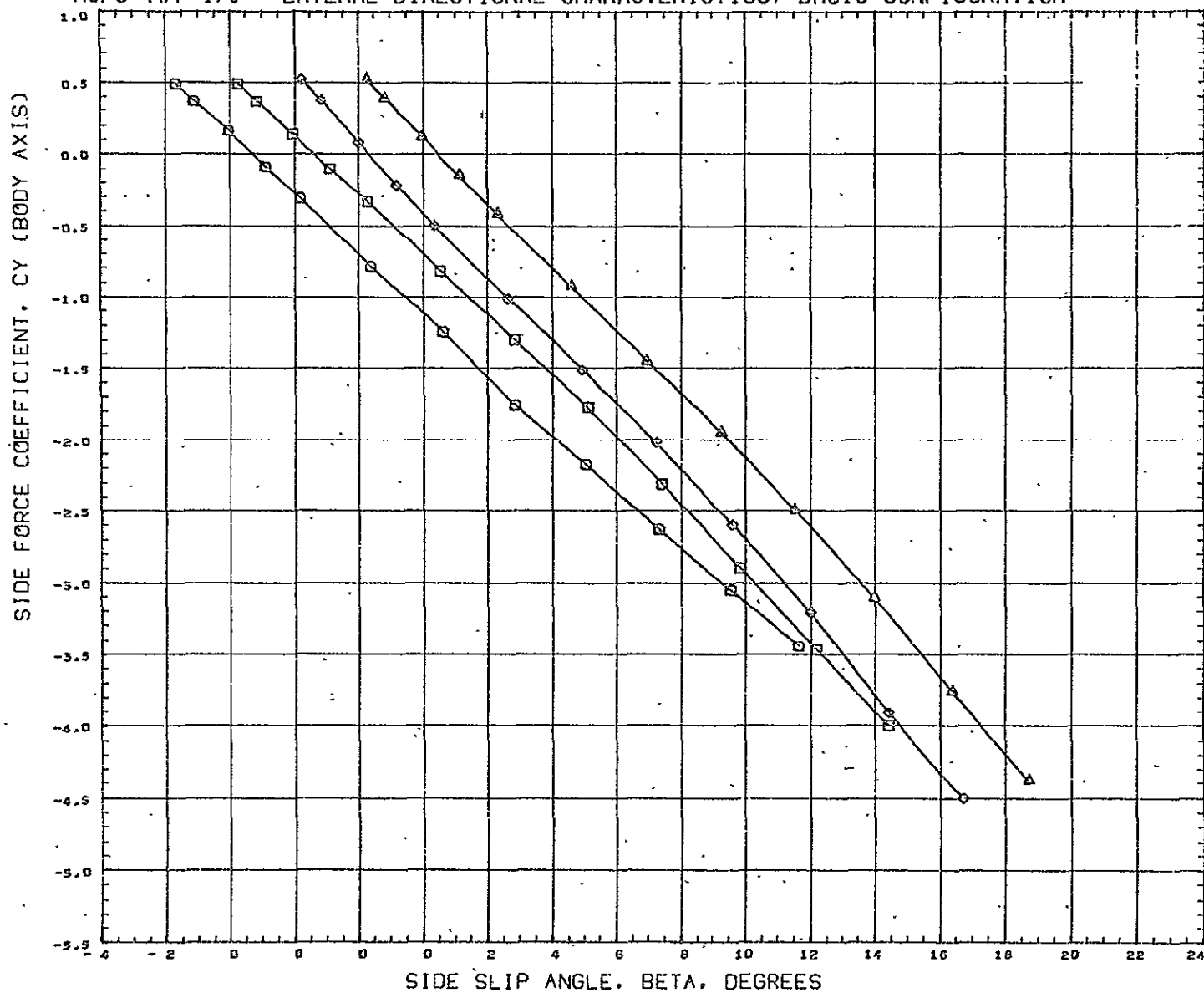
MSFC TWT 470 EFFECTS OF FIN ORIENTATION



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	PARAMETRIC VALUES	REFERENCE INFORMATION
(T24001)	TWT470 S-1C/GAC ORBITER BF10WHVS BASIC	BETA - 0.050 ORBINC - 1.050	REFS 1.3960 SQ.IN.
(A24121)	TWT470 S-1C/GAC ORBITER BF20WHVS PHIB = 45	WNGINC 4.000 HTAIL 0.000	REFL 1.3330 INCHES
(A24131)	TWT470 S-1C/GAC ORBITER BF20WHVS PHIB = 0	PHIB 0.000	REFB 1.3330 INCHES
			XHRP 5.2640 INCHES
			YHRP 0.0000 INCHES
			ZHRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MACH 1.456

MSFC TWT 470 LATERAL-DIRECTIONAL CHARACTERISTICS, BASIC CONFIGURATION

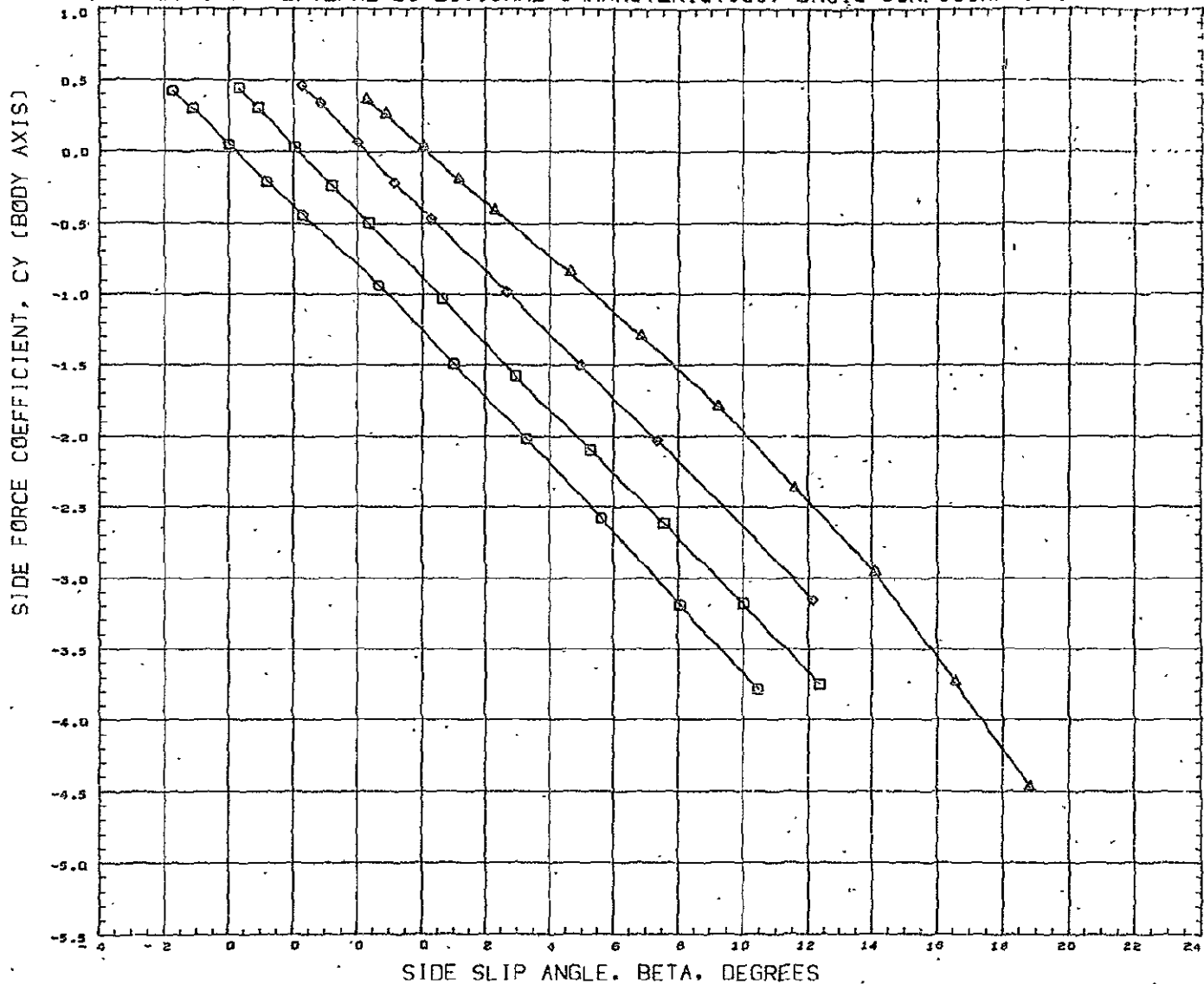


SYMBOL	MACH	PARAMETRIC VALUES			
○	0.596	ALPHA	0.360	ORBIT	1.050
◻	0.691	WINGINC	4.000	HTAIL	0.000
◊	0.997	PNIB	0.000		
△	1.093				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SO. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZHRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LATERAL-DIRECTIONAL CHARACTERISTICS, BASIC CONFIGURATION



SYMBOL	MACH	PARAMETRIC VALUES			
○	1.195	ALPHA	0.360	ORBINC	- 1.050
□	1.299	WINGINC	4.000	HTAIL	0.000
◇	1.439	PHIB	0.000		
△	1.926				

REFERENCE INFORMATION		
REFS	1.3960	SG.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

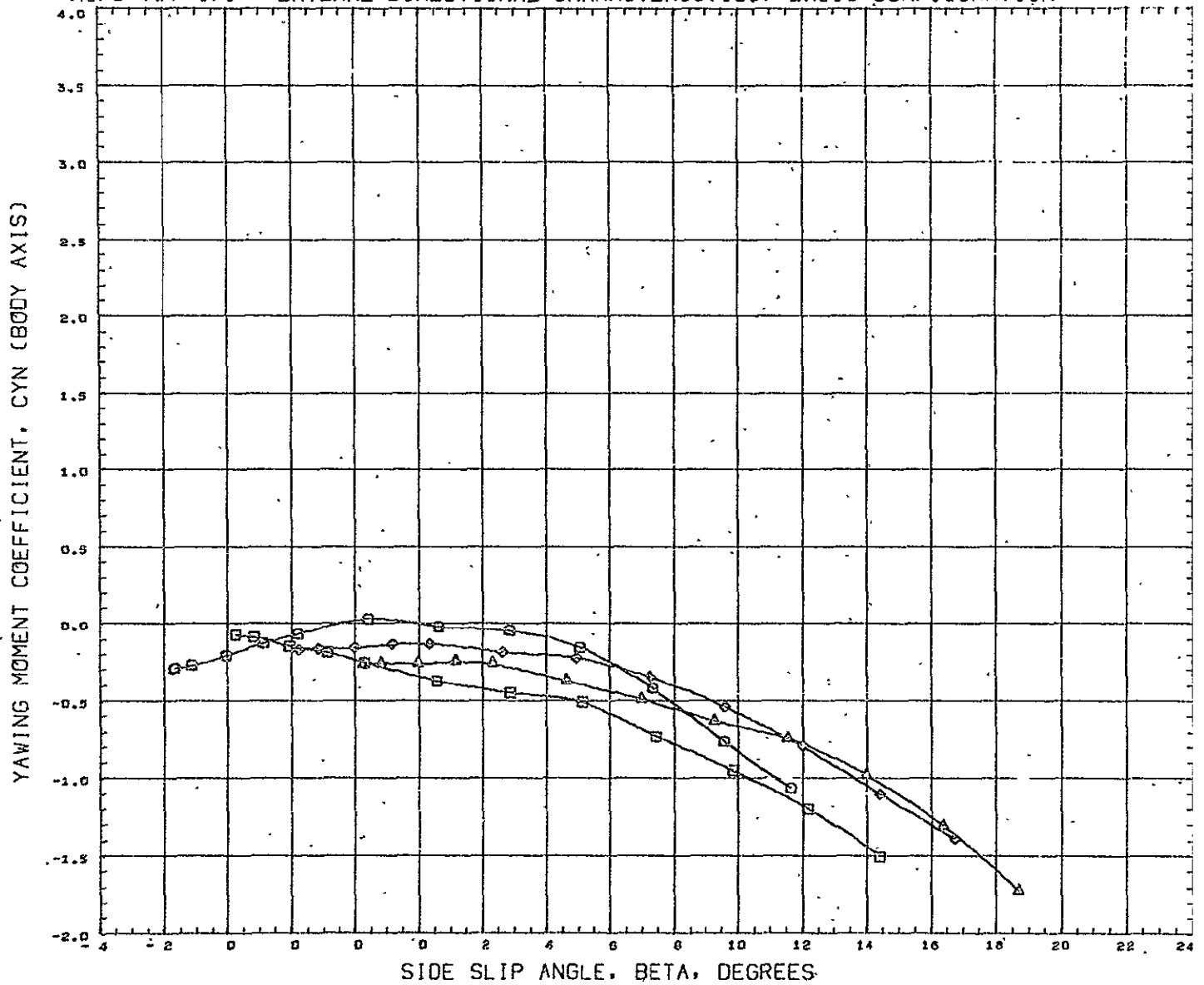
REFERENCE FILE

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 LATERAL-DIRECTIONAL CHARACTERISTICS, BASIC CONFIGURATION



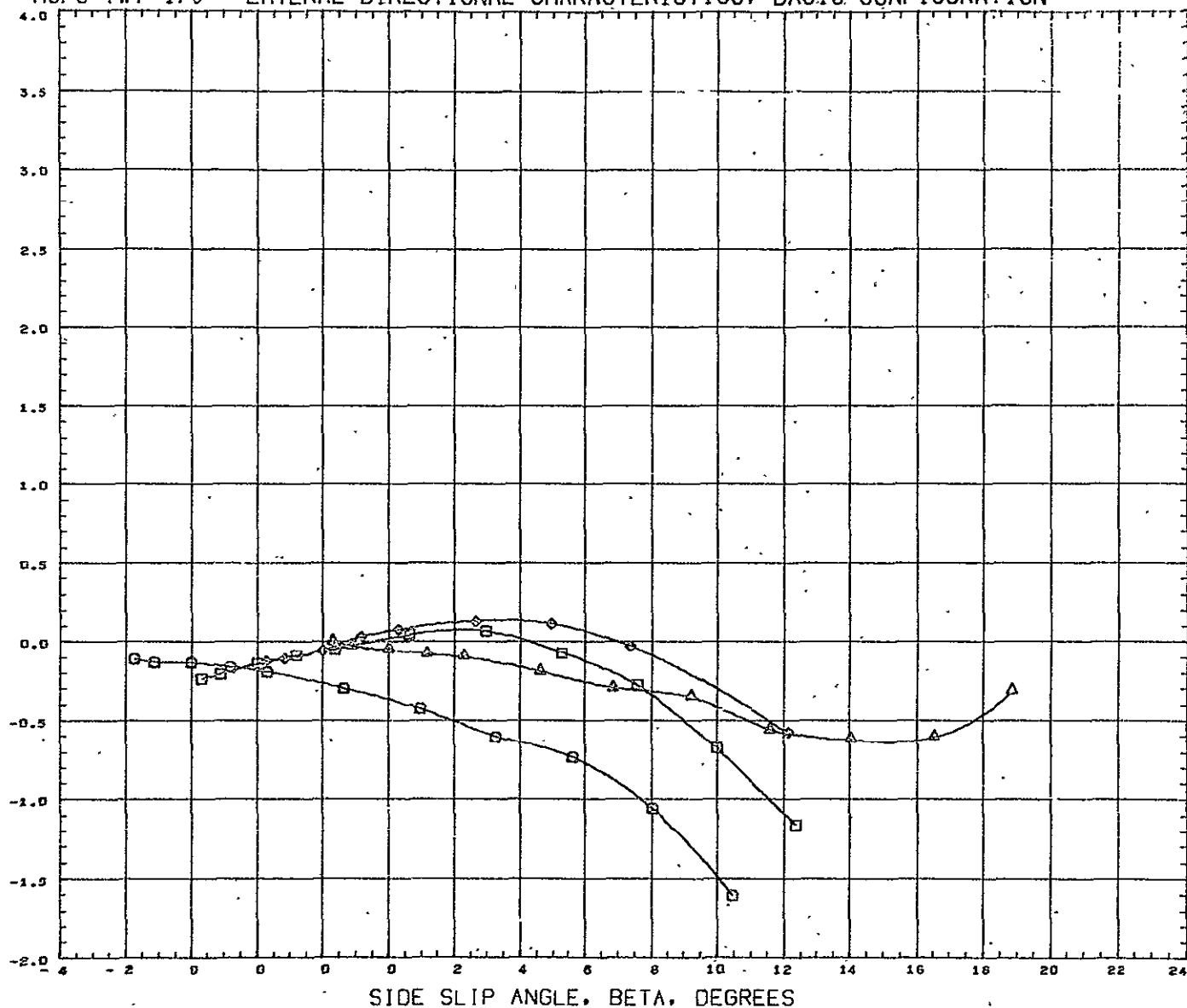
SYMBOL	MACH	PARAMETRIC VALUES			
□	0.596	ALPHA	0.360	ORBITAL	1.050
◇	0.891	WING INC	4.000	HTAIL	0.000
△	0.997	PHIB	0.000		
○	1.093				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LATERAL-DIRECTIONAL CHARACTERISTICS, BASIC CONFIGURATION

YAWING MOMENT COEFFICIENT, CYN (BODY AXIS)



SIDE SLIP ANGLE, BETA, DEGREES

SYMBOL	MACH	PARAMETRIC VALUES			
○	1.196	ALPHA	0.360	ORBINC	1.050
□	1.299	WINGINC	4.000	HTAIL	0.000
◇	1.459	PNIB	0.000		
△	1.954				

REFERENCE FILE

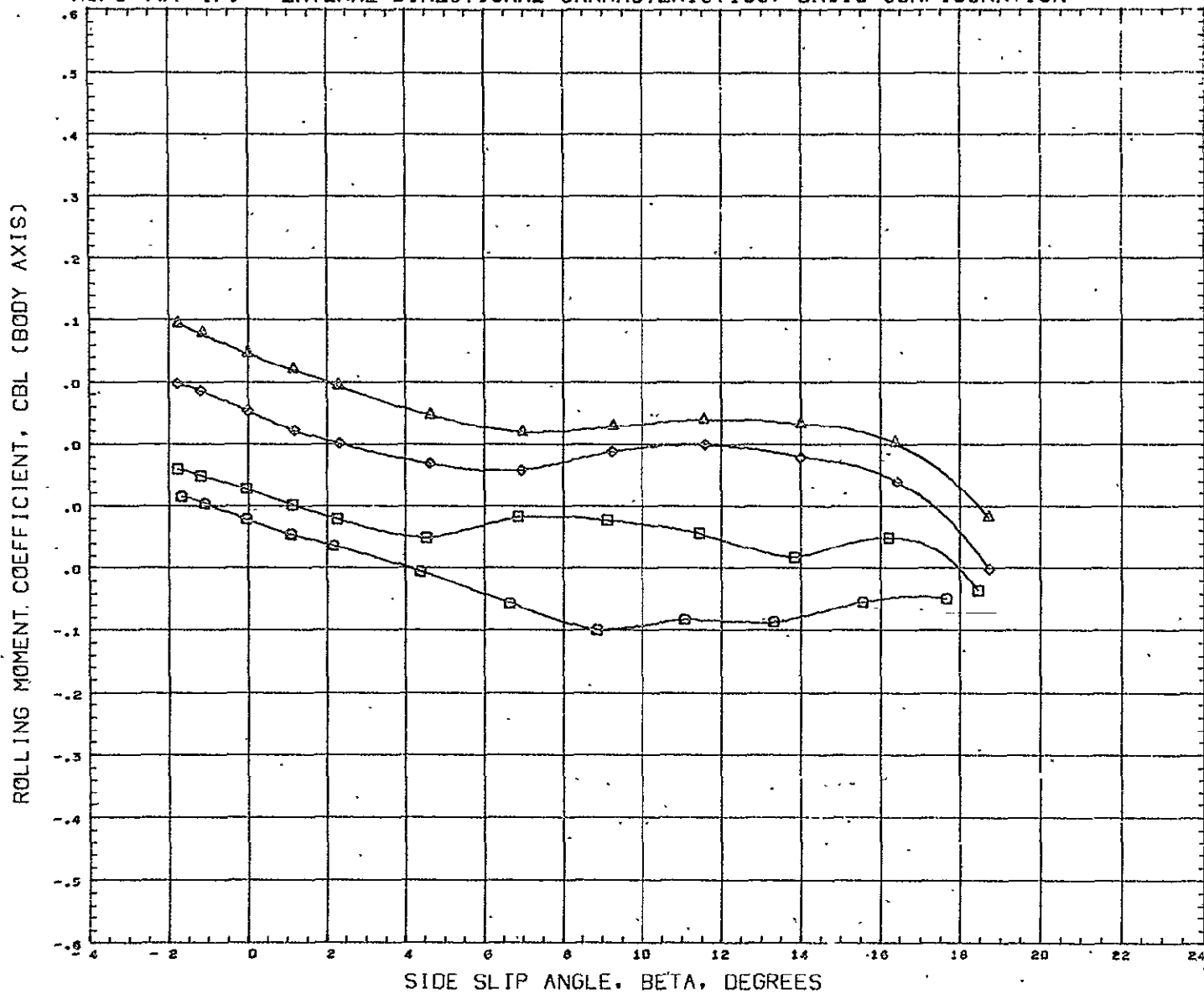
REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 LATERAL-DIRECTIONAL CHARACTERISTICS, BASIC CONFIGURATION



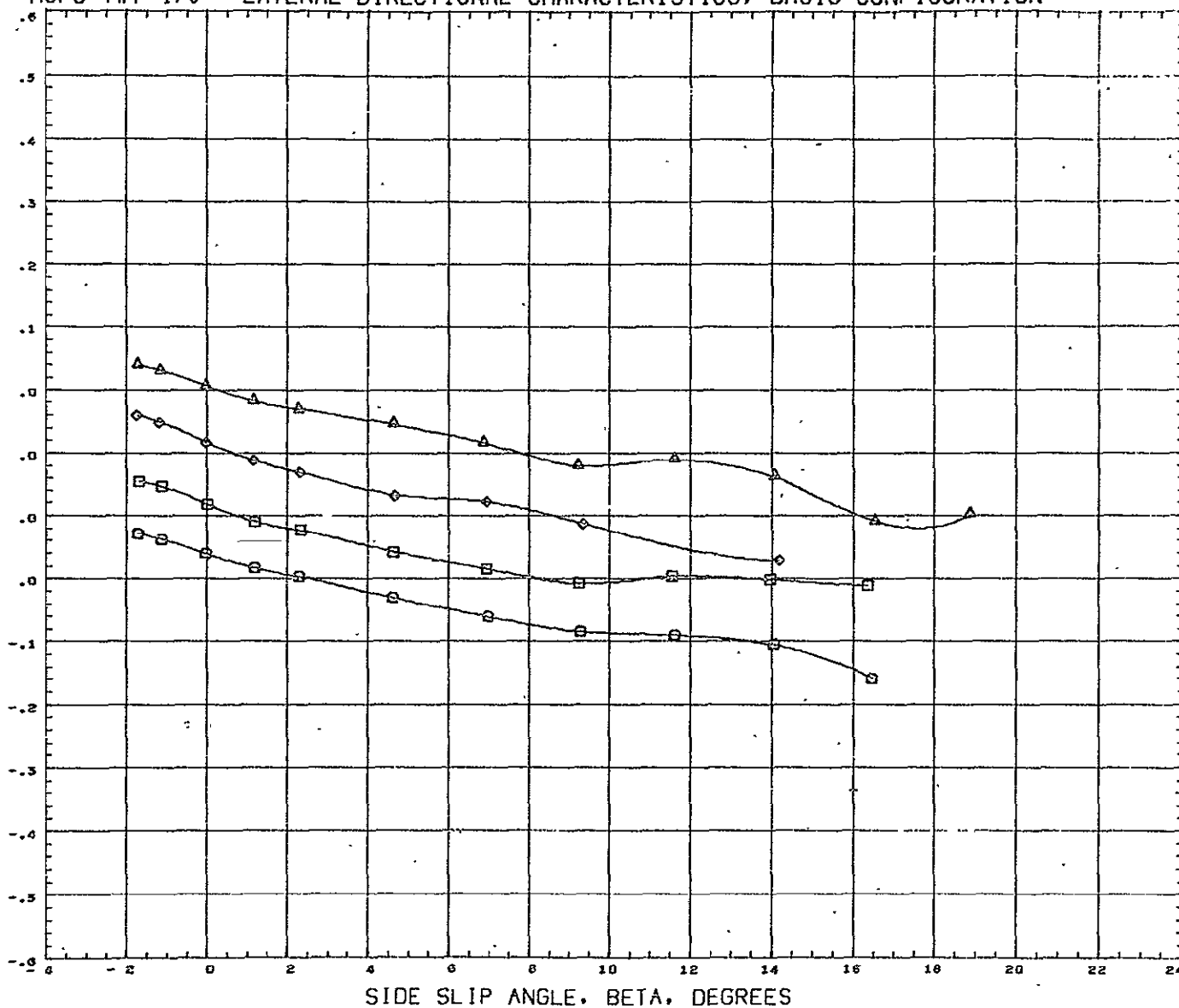
SYMBOL	MACH	PARAMETRIC VALUES
□	0.598	ALPHA 0.360 ORBINC - 1.050
◇	0.891	WINGINC 4.000 HTAIL 0.000
○	0.997	PHIB 0.000
△	1.093	

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LATERAL-DIRECTIONAL CHARACTERISTICS, BASIC CONFIGURATION

ROLLING MOMENT COEFFICIENT, CBL (BODY AXIS)



SIDE SLIP ANGLE, BETA, DEGREES

SYMBOL	MACH	PARAMETRIC VALUES			
□	1.196	ALPHA	0.360	ORBIT	- 1.050
◇	1.299	WINGINC	4.000	HTAIL	0.000
◇	1.459	PHIB	0.000		
△	1.954				

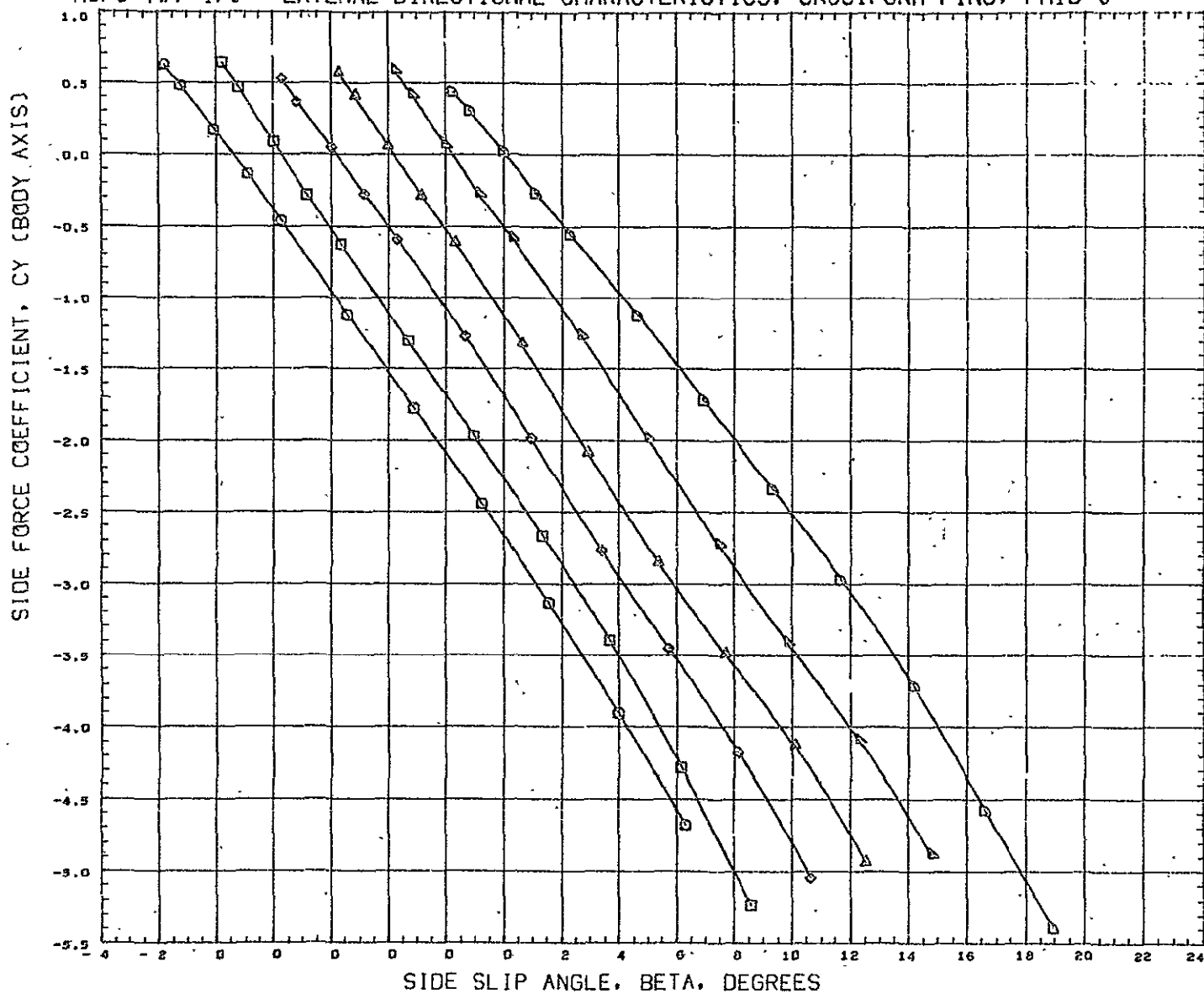
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REFERENCE INFORMATION		
REFS	1.3960	SQ.IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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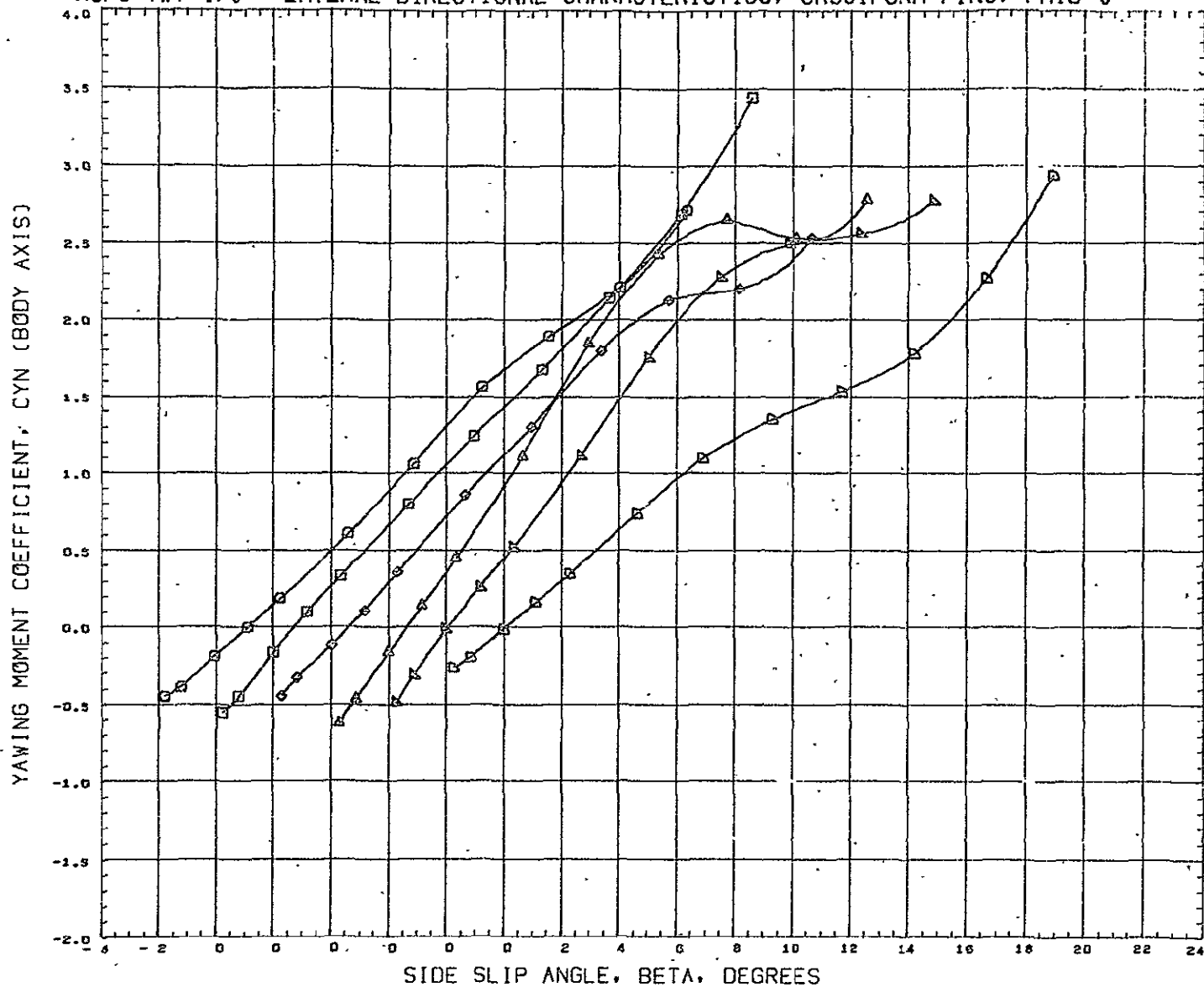
MSFC TWT 470 LATERAL-DIRECTIONAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=0



SYMBOL	NACH	PARAMETRIC VALUES
○	0.696	ALPHA 0.340 ORBINC 1.050
□	0.990	WNGINC 4.000 HTAIL 0.000
◇	1.196	PHIB 0.000
△	1.302	
▽	1.400	
×	1.953	DATA HIST. CODE *A

REFERENCE INFORMATION
REFS 1.3960 SQ. IN.
REFL 1.3330 INCHES
REFD 1.3330 INCHES
XHRP 5.2640 INCHES
YHRP 0.0000 INCHES
ZHRP 0.0000 INCHES
SCALE 0.3366 PERCENT

MSFC TWT 470 LATERAL-DIRECTIONAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=0



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.898	ALPHA	0.340	ORBINC	- 1.050
□	0.990	WNGINC	4.000	HTAIL	0.000
◇	1.198	PHIB	0.000		
△	1.302				
▽	1.400				
◻	1.953	DATA HIST. CODE	NA		

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

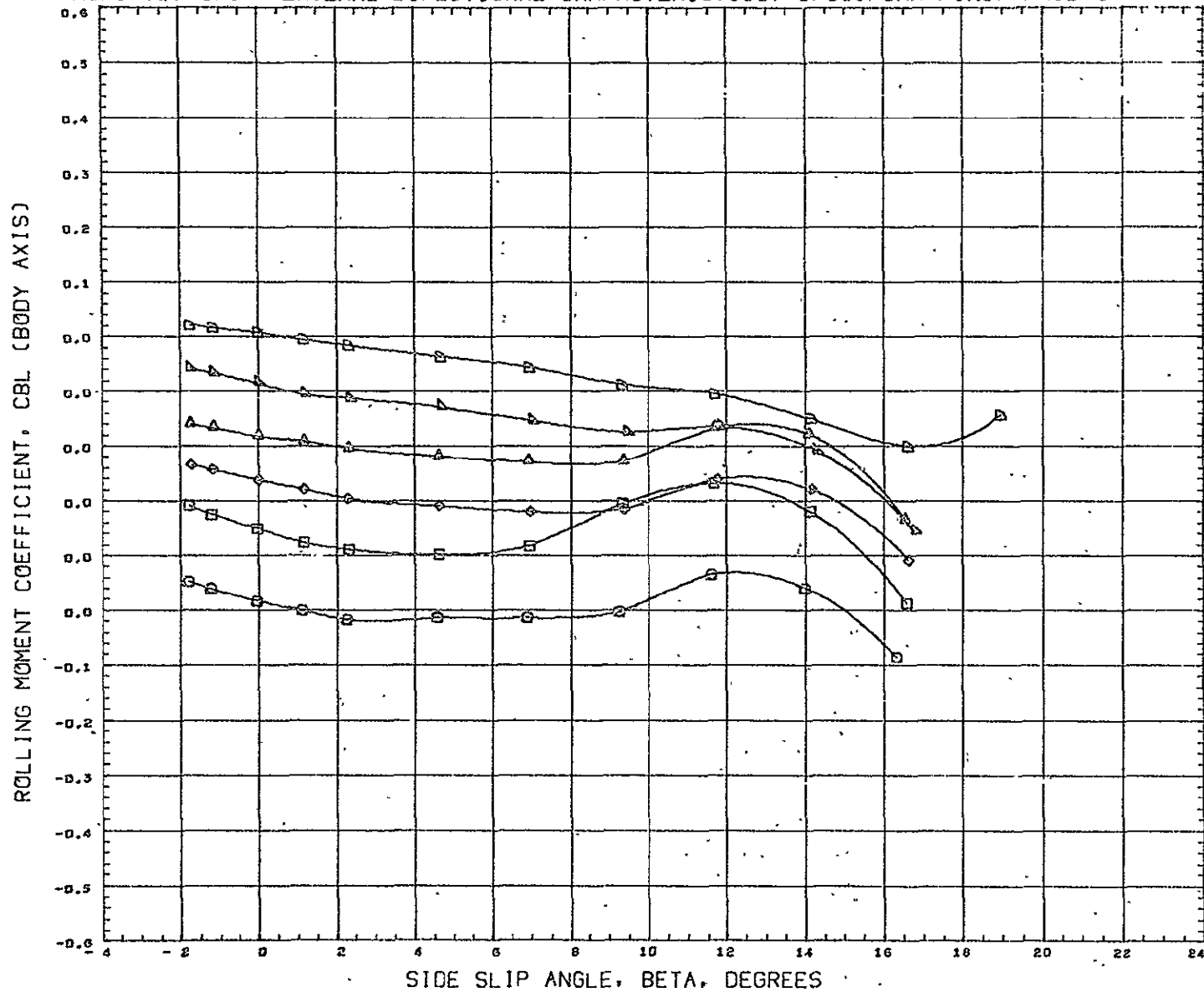
TWT470 S-IC/GAC ORBITER. BF20WHVS CRUCIFORM

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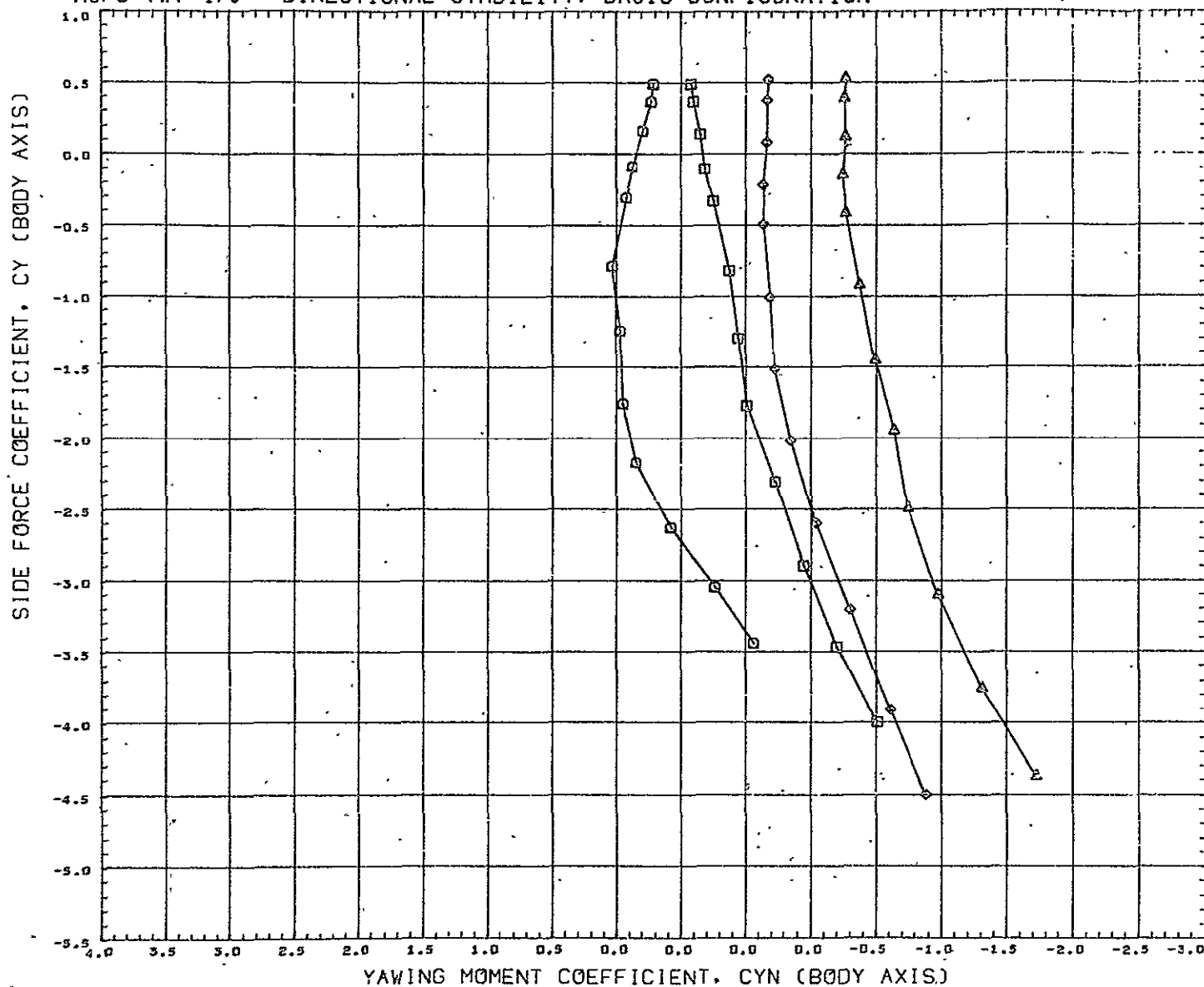
MSFC TWT-470 LATERAL-DIRECTIONAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=0



PARAMETER	VALUE	UNIT
MACH	0.096	
ALPHA	0.340	DEGREES
ORBITAL	1.050	
WING INC	4.000	DEGREES
HTAIL	0.000	
PHIB	0.000	DEGREES
DATA HIST. CODE	#A	

REFERENCE INFORMATION	VALUE	UNIT
REFS	1.3960	INCHES
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3365	PERCENT

MSFC TWT 470 DIRECTIONAL STABILITY, BASIC CONFIGURATION



PARAMETRIC VALUES					REFERENCE INFORMATION		
SYMBOL	MACH	ALPHA	ORBIT	ORBIT	REFS	1.3960	SQ. IN.
\square	0.596	0.360	ORBINC	- 1.050	REFL	1.3330	INCHES
\diamond	0.891	4.000	HTAIL	0.000	REFB	1.3330	INCHES
\circ	0.997	0.000			XMRP	5.2640	INCHES
\triangle	1.093				YMRP	0.0000	INCHES
					ZMRP	0.0000	INCHES
					SCALE	0.3366	PERCENT

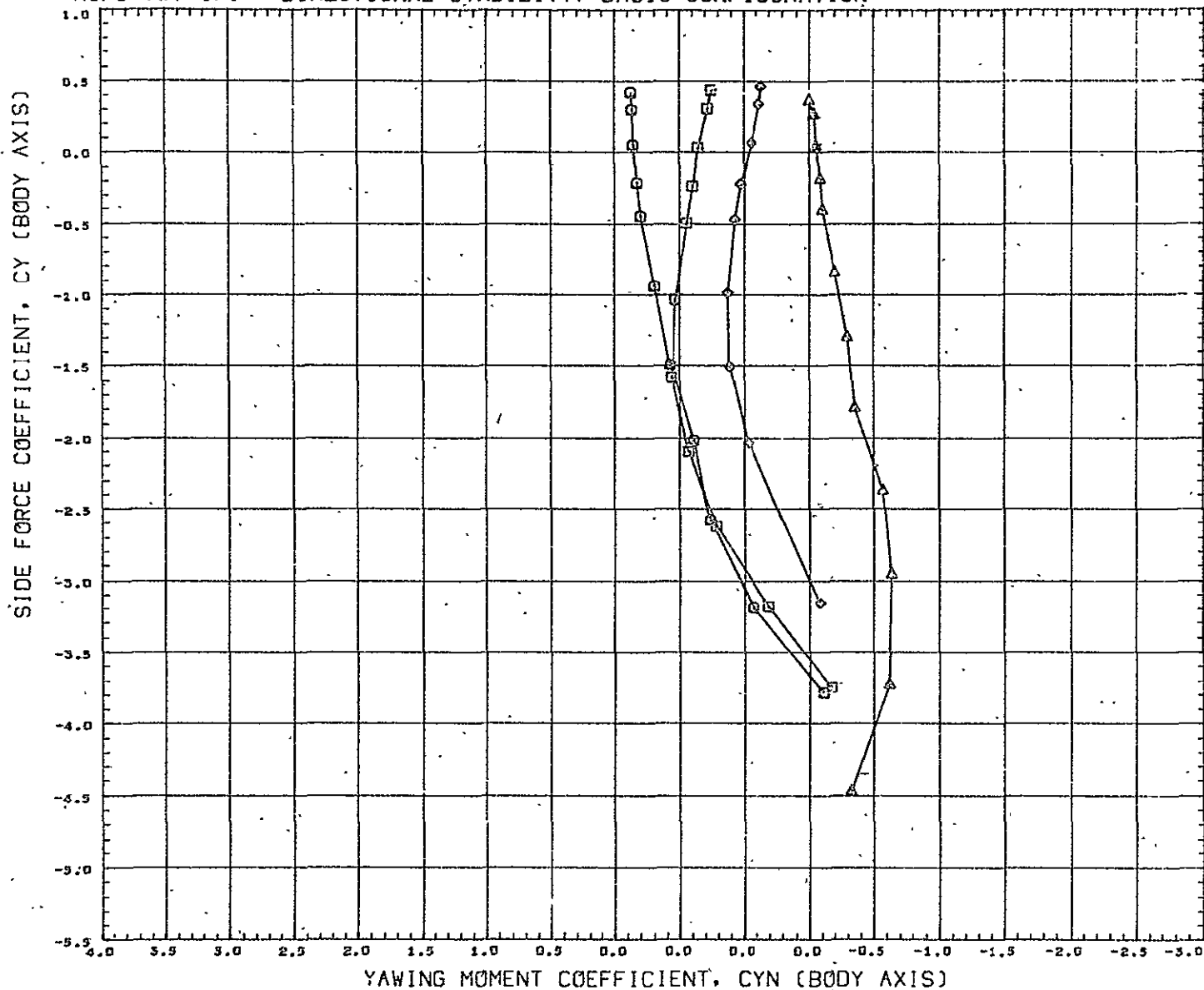
REFERENCE FILE

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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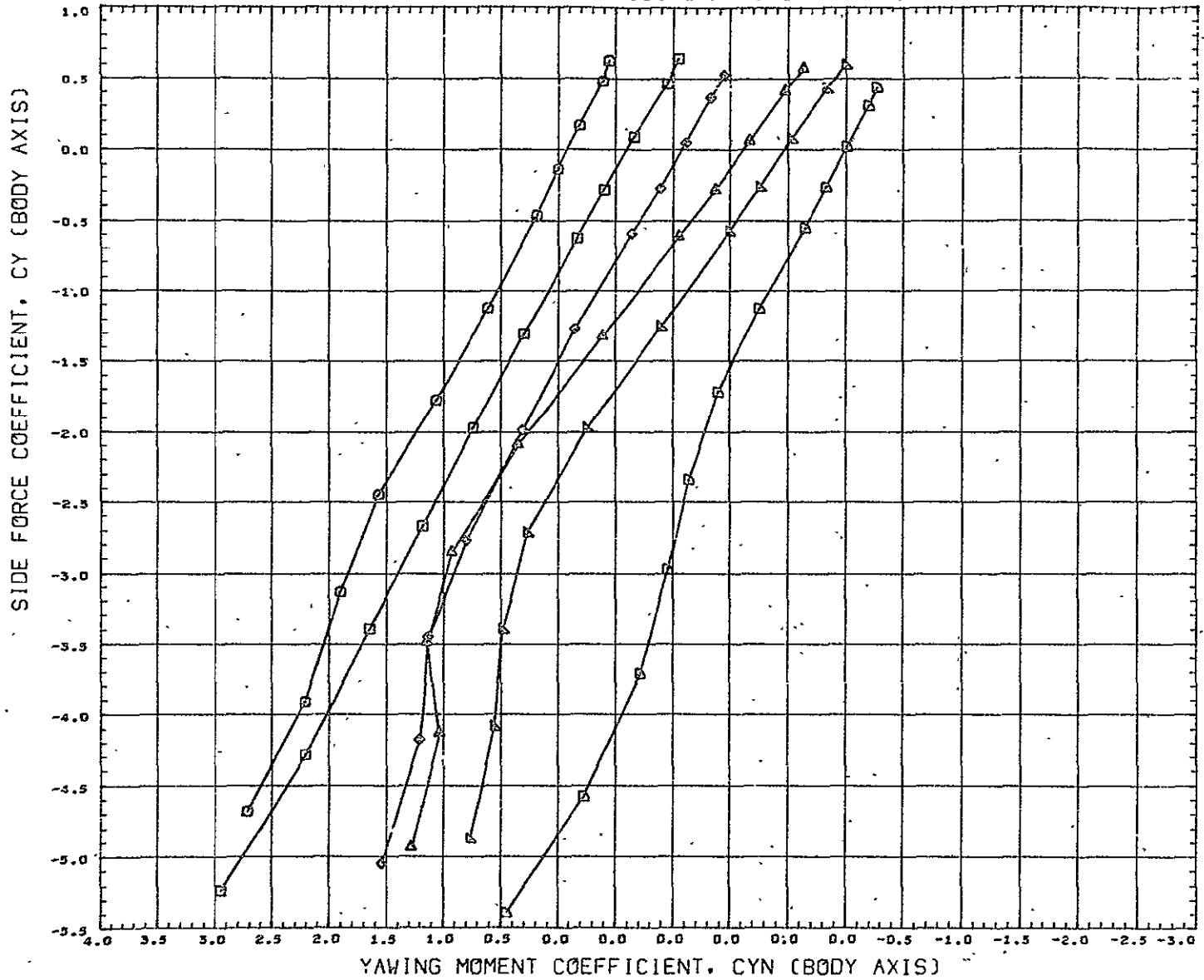
MSFC TWT 470 DIRECTIONAL STABILITY, BASIC CONFIGURATION



PARAMETRIC VALUES				REFERENCE INFORMATION		
SYMBOL	MACH	ALPHA	ORBITAL	REFS	SCALE	PERCENT
\circ	1.196	0.360	1.050	REFS	1.3960	50. IN.
\square	1.299	4.000	0.000	REFL	1.3330	INCHES
\diamond	1.459	0.000		REFB	1.3330	INCHES
\triangle	1.954			XMRP	5.2640	INCHES
				YMRP	0.0000	INCHES
				ZMRP	0.0000	INCHES
				SCALE	0.3366	PERCENT

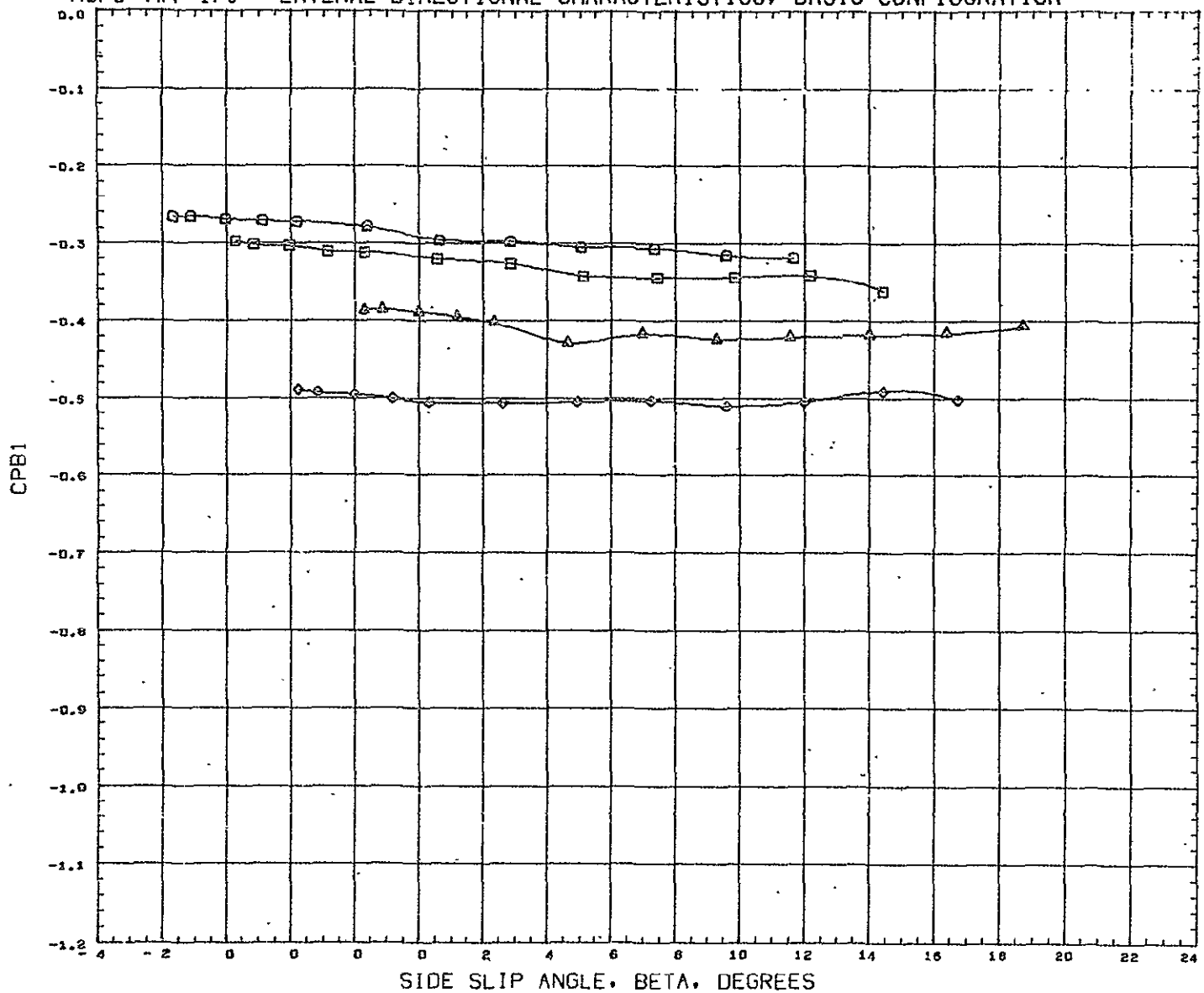
REFERENCE FILE

MSFC TWT 470 DIRECTIONAL STABILITY, CRUCIFORM FINS, PHIB=0



SYMBOL	MACH	PARAMETRIC VALUES	REFERENCE INFORMATION
○	0.096	ALPHA 0.340 ORDINC - 1.050	REFS 1.3960 SQ. IN.
□	0.950	WNGINC 4.000 HTAIL 0.000	REFL 1.3330 INCHES
◇	1.196	PHIB 0.000	REFB 1.3330 INCHES
△	1.302		XMRP 5.2640 INCHES
▽	1.480		YMRP 0.0000 INCHES
◇	1.953	DATA HIST. CODE *A	ZMRP 0.0000 INCHES
			SCALE 0.3366 PERCENT

MSFC TWT 470 LATERAL-DIRECTIONAL CHARACTERISTICS, BASIC CONFIGURATION



SYMBOL	HACH	PARAMETRIC VALUES
□	0.596	ALPHA 0.360 ORBINC - 1.050
◻	0.691	WNGINC 4.000 HTAIL 0.000
◇	0.997	PHIB 0.000
△	1.093	

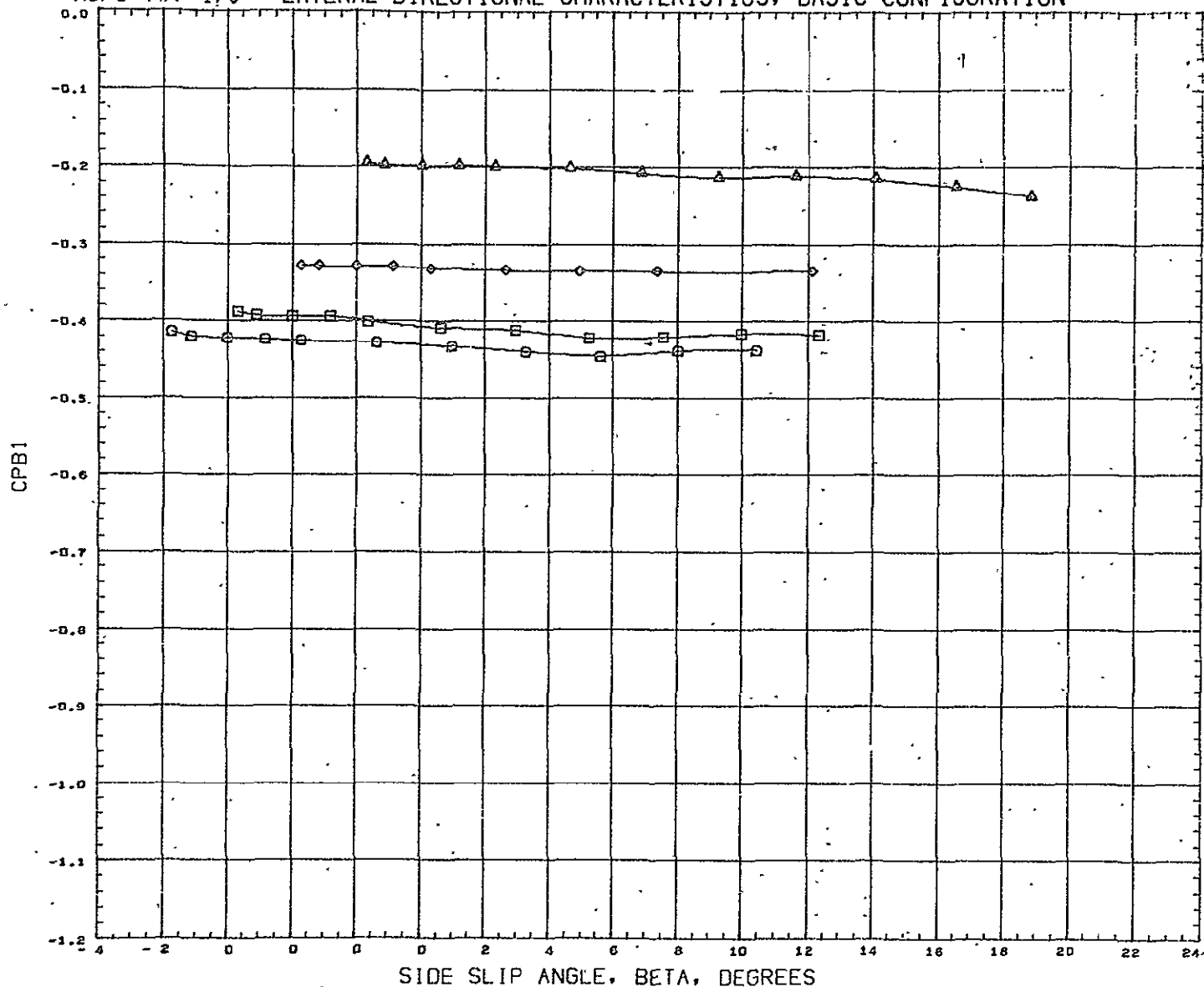
REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XNRP	5.2640	INCHES
YNRP	0.0000	INCHES
ZNRP	0.0000	INCHES
SCALE	0.3366	PERCENT

TWT470 S-1C/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 LATERAL-DIRECTIONAL CHARACTERISTICS, BASIC CONFIGURATION



SYMBOL	MACH	PARAMETRIC VALUES			
□	1.196	ALPHA	0.360	ORBINC	- 1.050
□	1.299	WINGINC	4.000	HTAIL	0.000
◇	1.459	PHIS	0.000		
△	1.954				

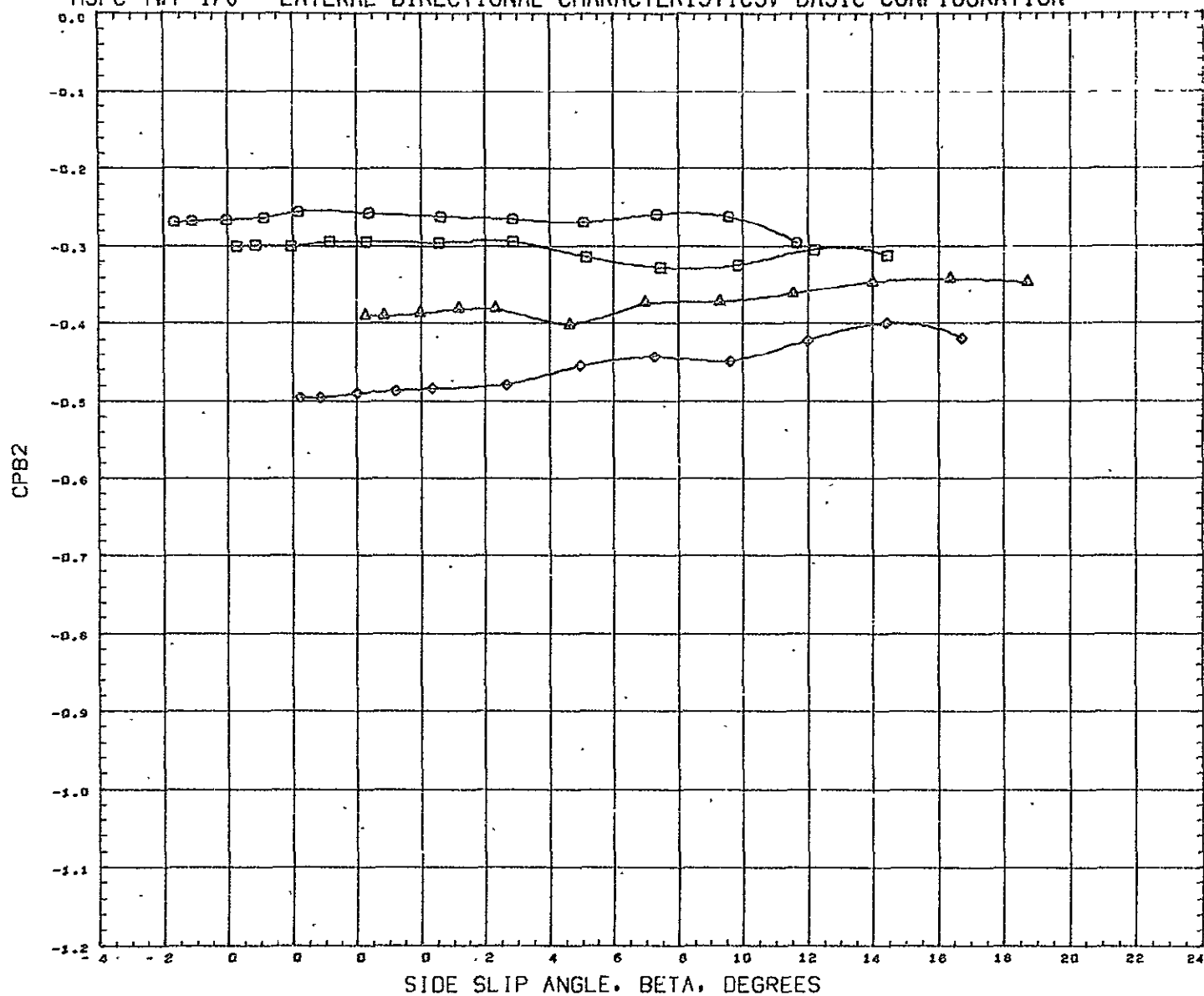
REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 LATERAL-DIRECTIONAL CHARACTERISTICS, BASIC CONFIGURATION

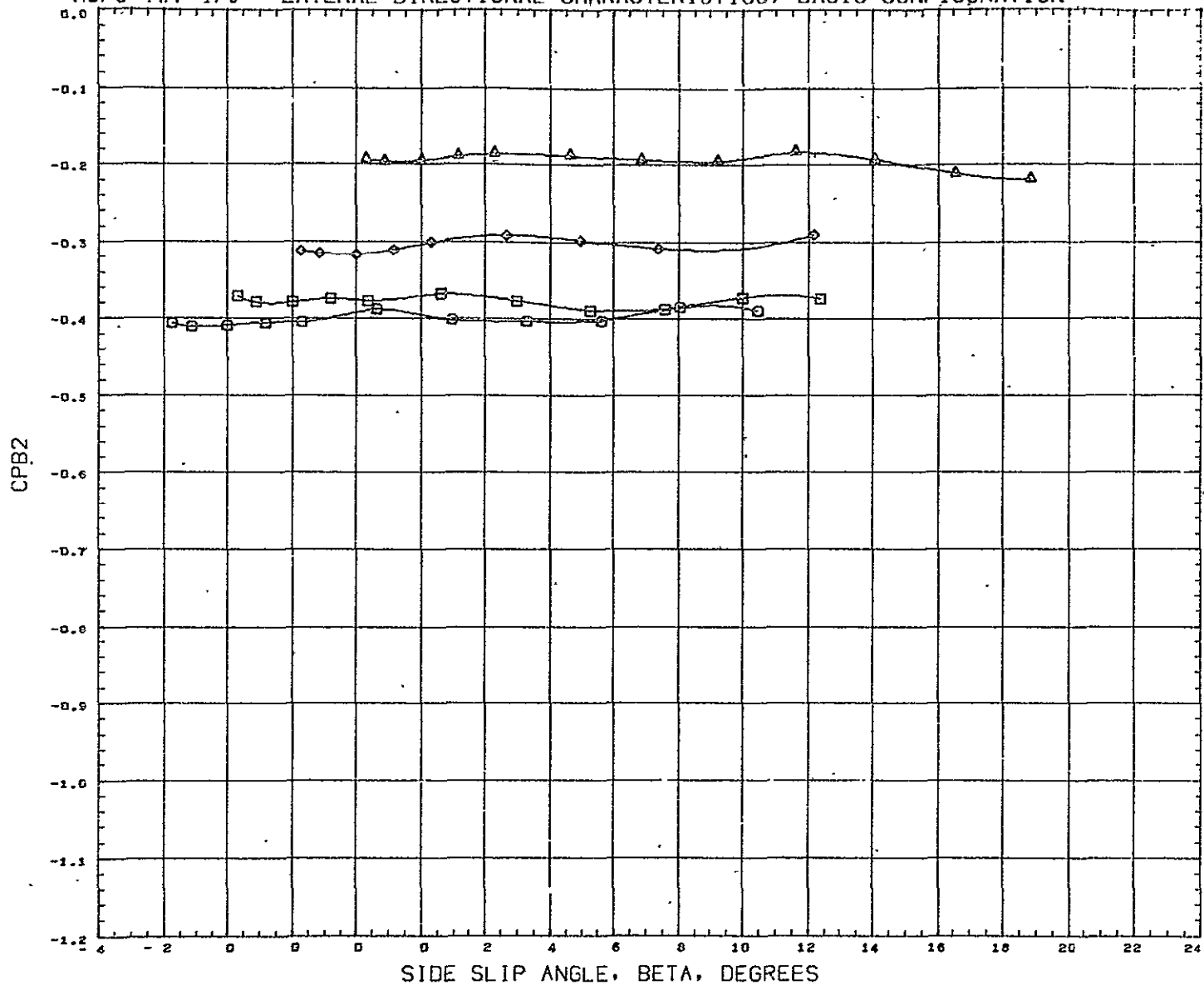


SYMBOL	NACH	PARAMETRIC VALUES			
		ALPHA	ORBINC	WINGC	HTAIL
○	0.598	0.360	1.050		
□	0.891	4.000	0.000		
△	0.997	0.000			
◇	1.093				

REFERENCE FILE

REFERENCE INFORMATION		
REFS	1.3960	50.1N.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LATERAL-DIRECTIONAL CHARACTERISTICS, BASIC CONFIGURATION



SYMBOL	MACH	PARAMETRIC VALUES
□	1.196	ALPHA 0.360 ORBINC - 1.050
◻	1.299	WNGINC 4.000 HTAIL 0.000
◊	1.459	PHIB 0.000
Δ	1.954	

REFERENCE FILE

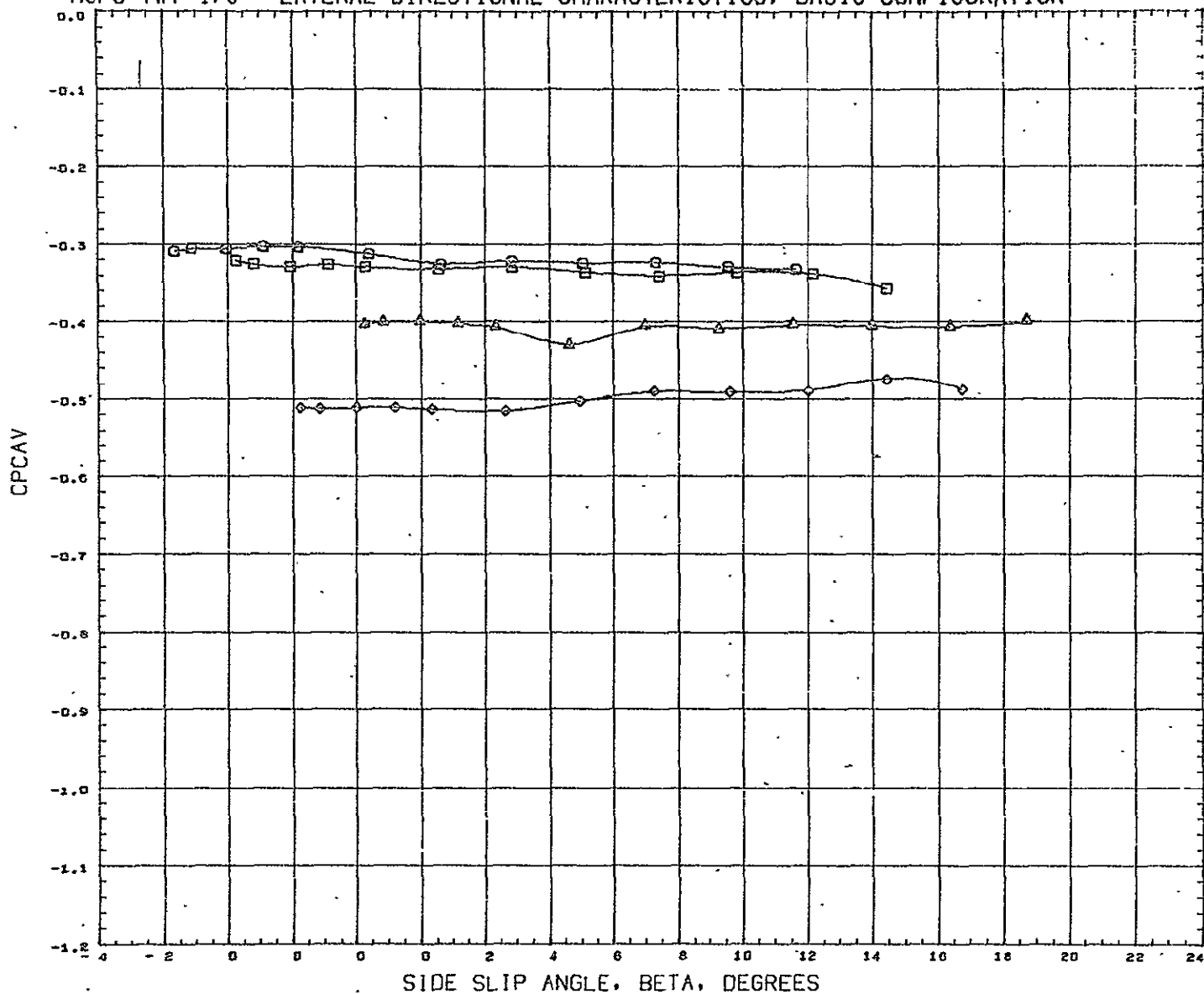
REFERENCE INFORMATION		
REFS	1.3960	SQ. IN.
REFL	1.3330	INCHES
REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

TWT470'S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 LATERAL-DIRECTIONAL CHARACTERISTICS, BASIC CONFIGURATION

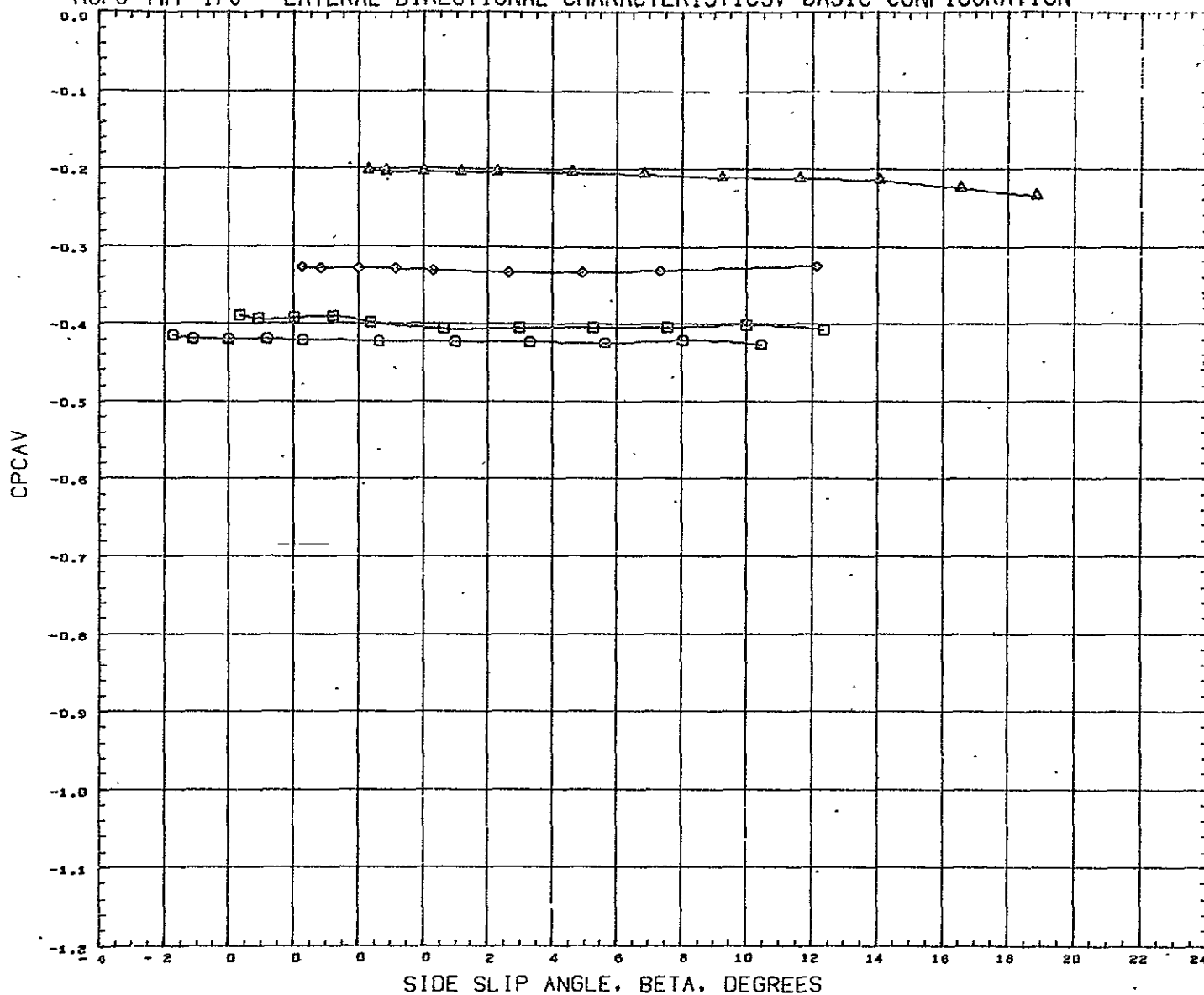


SYMBOL	HACH	PARAMETRIC VALUES			
○	0.596	ALPHA	0.360	ORBINC	- 1.050
□	0.891	WNGINC	4.000	HTAIL	0.000
◇	0.997	PHIB	0.000		
△	1.093				

REFERENCE FILE

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REFB	1.3330	INCHES
XMRP	5.2640	INCHES
YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCNT

MSFC TWT 470 LATERAL-DIRECTIONAL CHARACTERISTICS, BASIC CONFIGURATION



SYMBOL	MACH	PARAMETRIC VALUES
Q	1.196	ALPHA 0.360 ORBINC - 1.050
□	1.299	WINGINC 4.000 HTAIL 0.000
◇	1.459	PHIB 0.000
△	1.954	

REFERENCE FILE

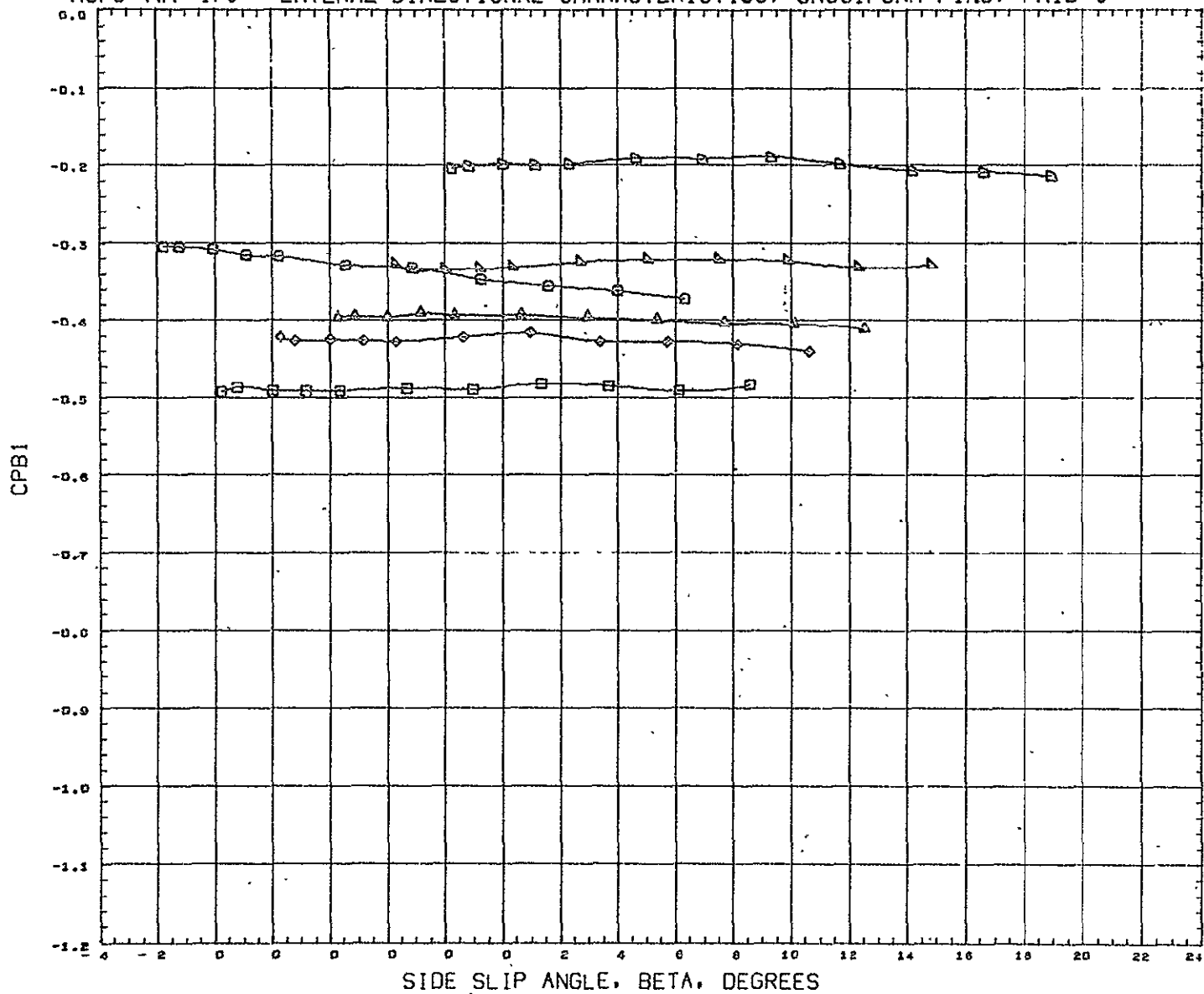
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SCALE 0.3366 PERCENT

TWT470 S-1C/GAC ORBITER BF10WHVS BASIC

(A24082) 26 JAN 71

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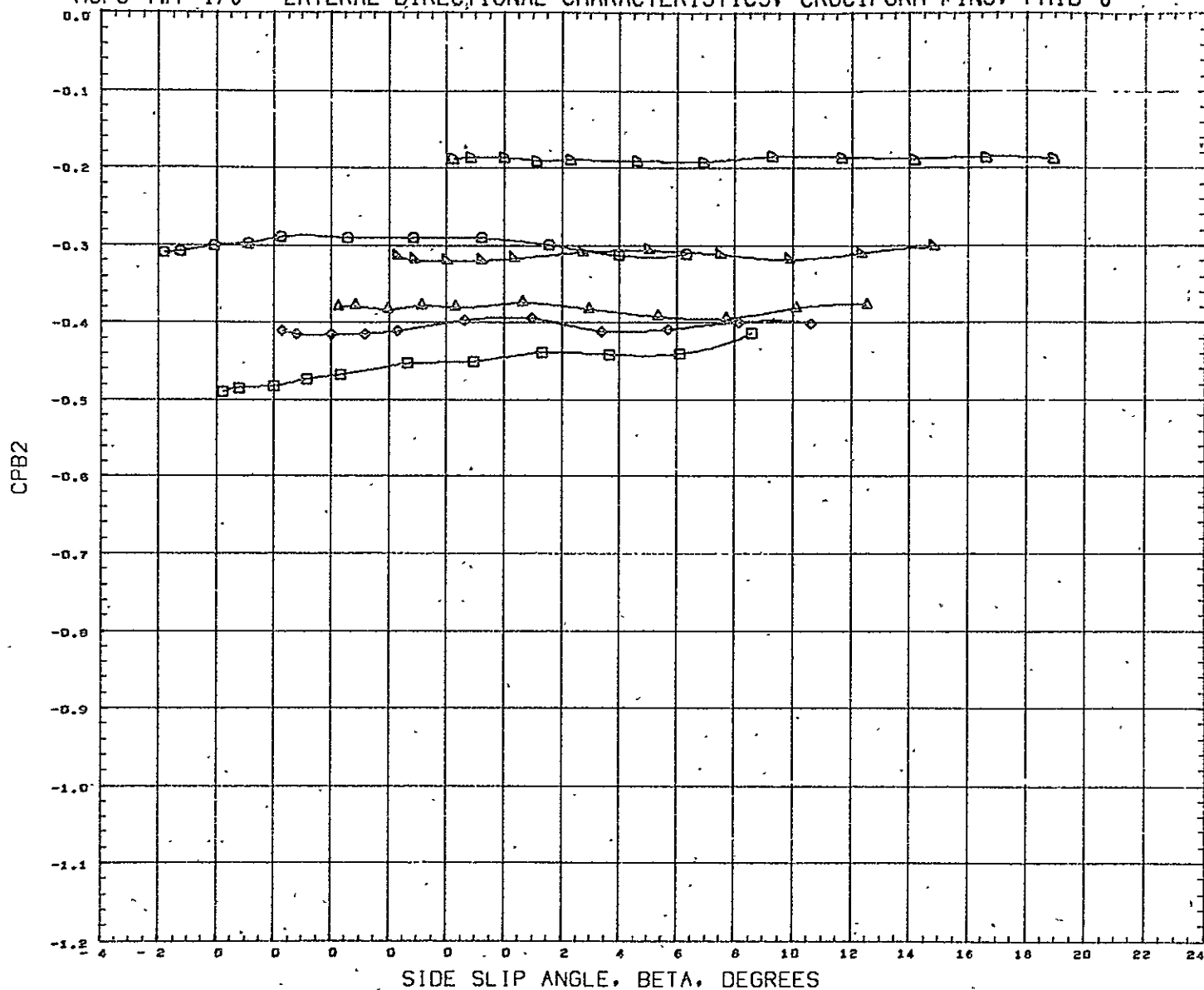
MSFC TWT 470 LATERAL-DIRECTIONAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=0



SYMBOL	MACH	PARAMETRIC VALUES
□	0.895	ALPHA 0.340 ORBINC - 1.050
□	0.990	WNGINC 4.000 HTAIL 0.000
◇	1.196	PHIB 0.000
△	1.302	
▷	1.400	
◻	1.953	DATA HIST. CODE 8A

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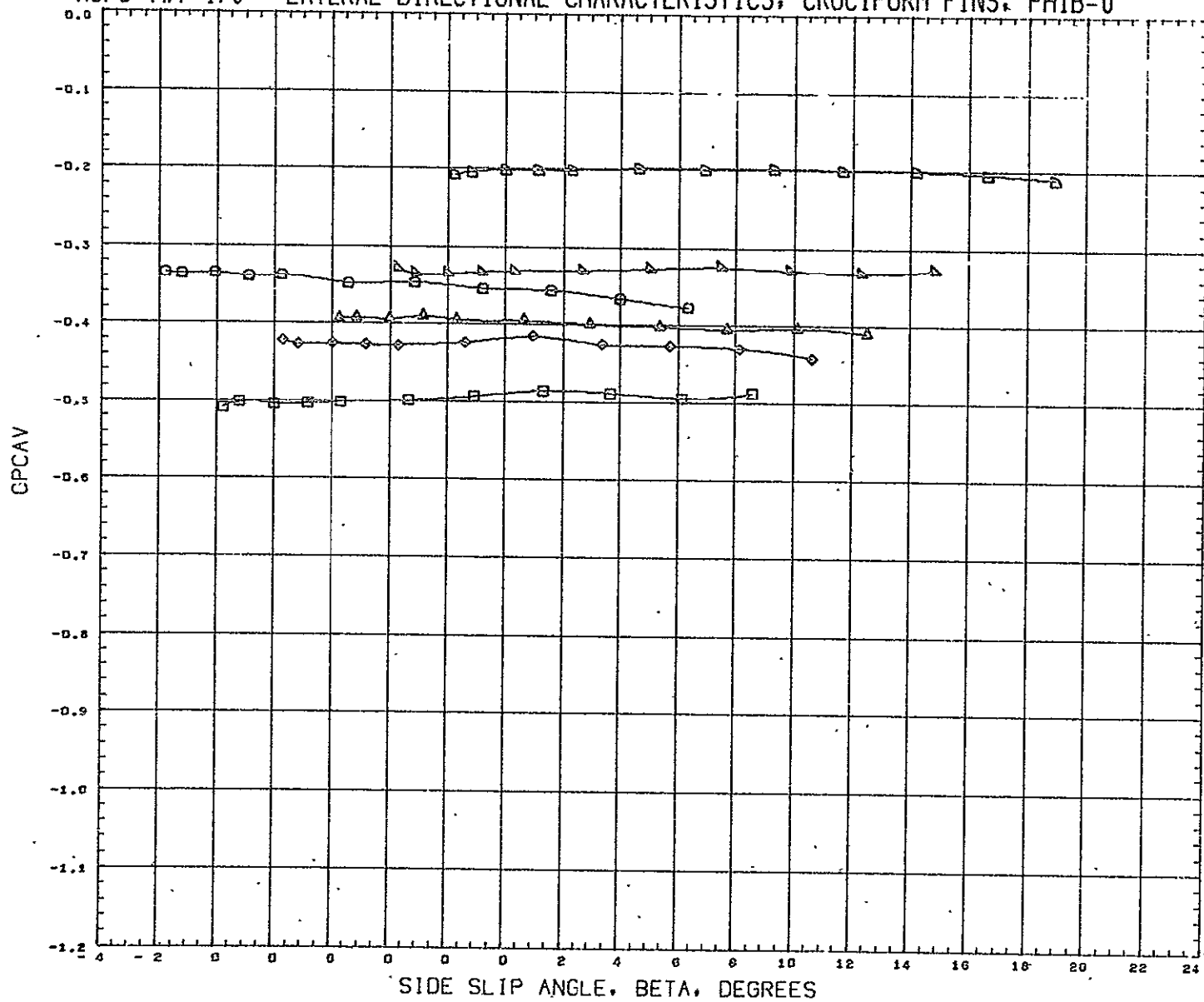
MSFC TWT 470 LATERAL-DIRECTIONAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=0



SYMBOL	MACH	PARAMETRIC VALUES
□	0.896	ALPHA 0.340 ORBINC - 1.050
□	0.990	WINGINC 4.000 HTAIL 0.000
◇	1.196	PHIB 0.000
△	1.302	
△	1.460	
◇	1.953	DATA HIST. CODE #A

REFERENCE INFORMATION		
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REFL	1.3330	INCHES
REFB	1.3330	INCHES
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SCALE	0.3366	PERCENT

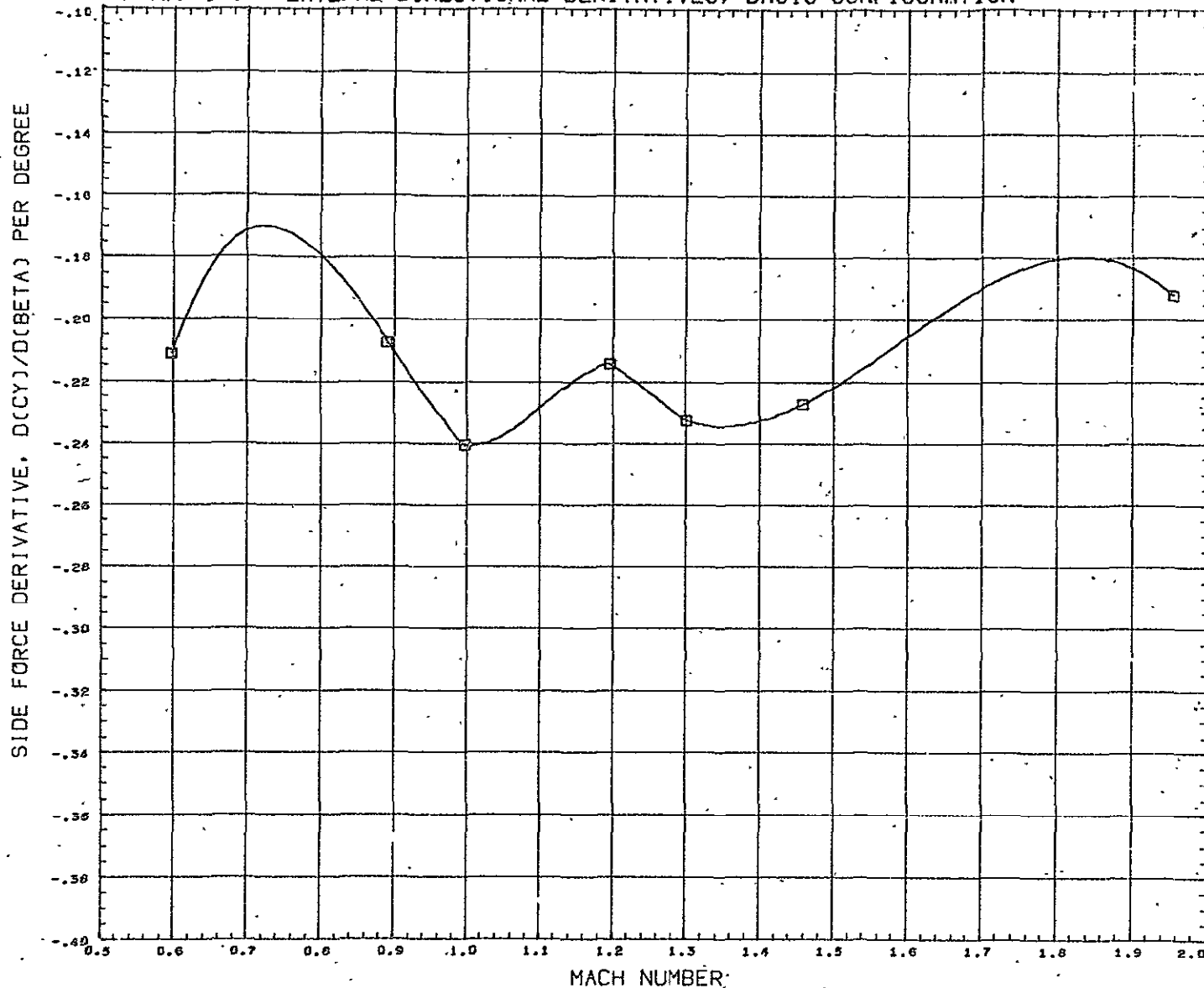
MSFC TWT 470 LATERAL-DIRECTIONAL CHARACTERISTICS, CRUCIFORM FINS, PHIB=0



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.896	ALPHA	0.340	ORBINC	- 1.050
□	0.990	WINGINC	4.000	HTAIL	0.000
◇	1.196	PHIB	0.000		
△	1.302				
▲	1.460				
◻	1.953	DATA HIST. CODE	*A		

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ZMRF	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LATERAL-DIRECTIONAL DERIVATIVES, BASIC CONFIGURATION



PARAMETRIC VALUES
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 WNGINC 4.000 HTAIL - 0.000
 PHIB 0.000

DATA HIST. CODE #A

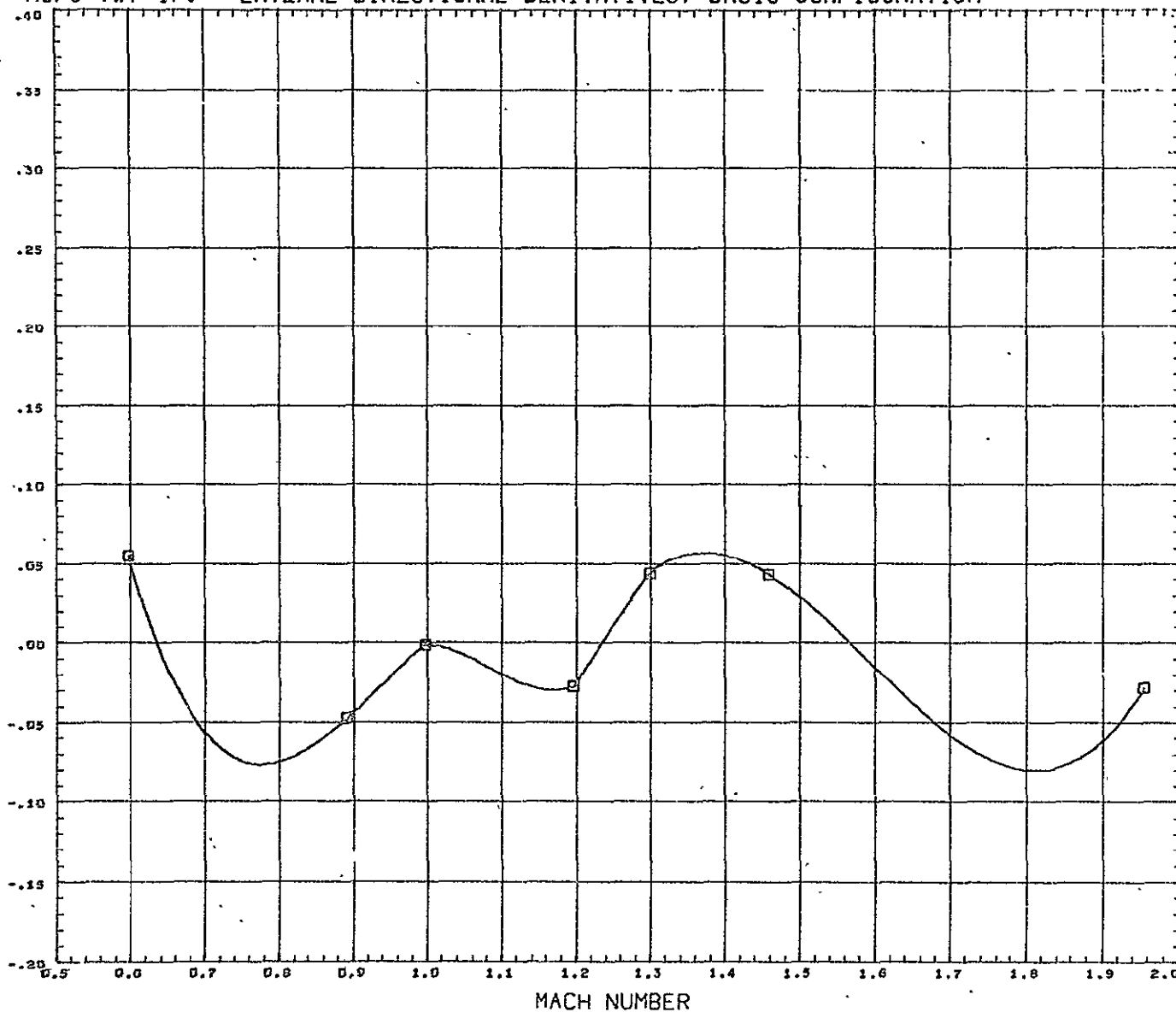
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 SCALE 0.3366 PERCENT

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 LATERAL-DIRECTIONAL DERIVATIVES, BASIC CONFIGURATION

YAWING MOMENT DERIVATIVE, $D(CYN)/D(BETA)$ PER DEGREE



PARAMETRIC VALUES

ALPHA	0.360	ORBINC	- 1.050
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PHIB	0.000		

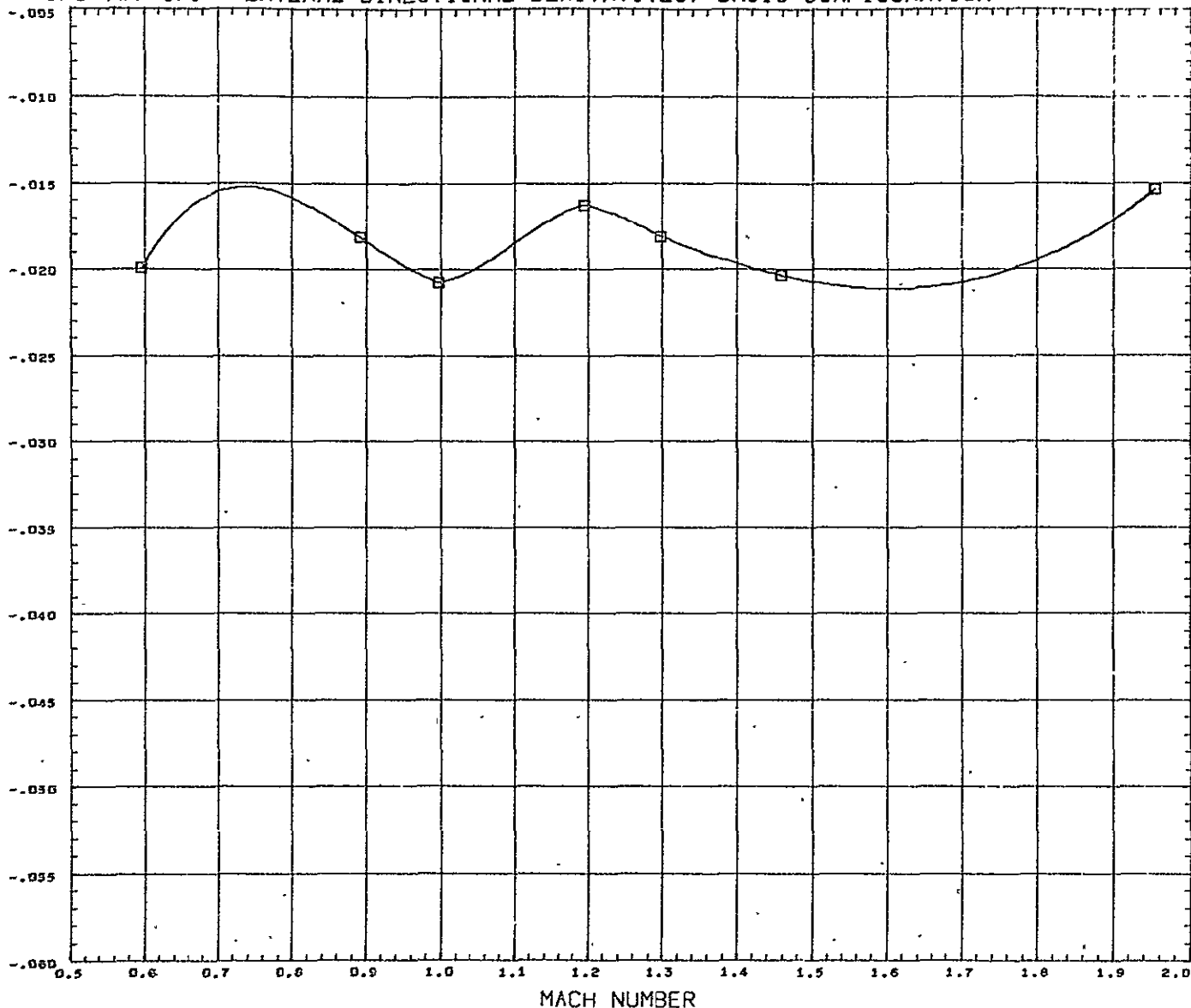
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YMRP	0.0000	INCHES
ZMRP	0.0000	INCHES
SCALE	0.3366	PERCENT

MSFC TWT 470 LATERAL-DIRECTIONAL DERIVATIVES, BASIC CONFIGURATION

ROLLING MOMENT DERIVATIVE, $D(CBL)/D(\beta)$ PER DEGREE



PARAMETRIC VALUES
ALPHA 0.360 ORBINC - 1.050
WINGINC 4.000 HTAIL 0.000
PHIB 0.000

REFERENCE INFORMATION
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SCALE 0.3366 PERCENT

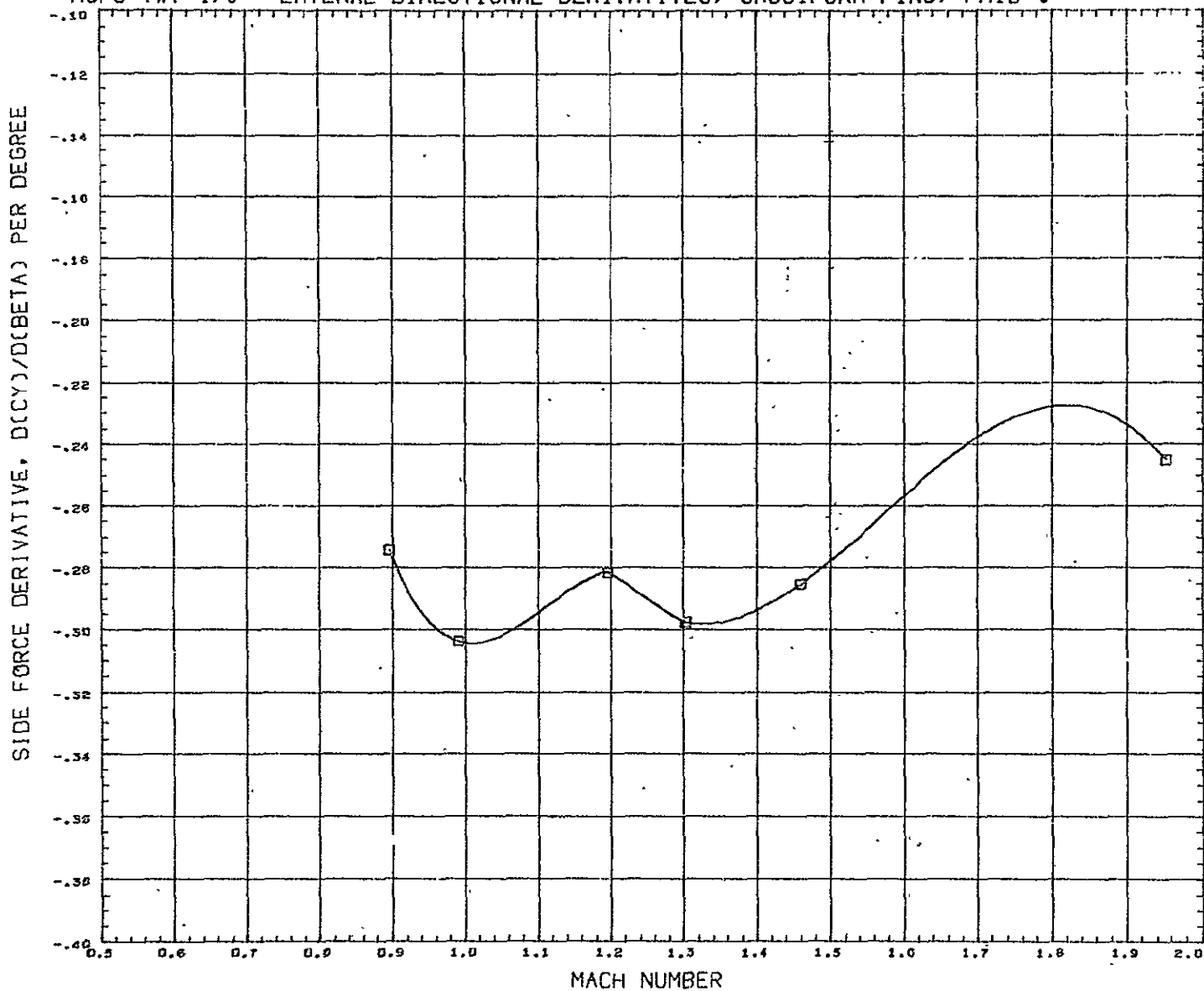
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TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 LATERAL-DIRECTIONAL DERIVATIVES, CRUCIFORM FINS, PHIB=0

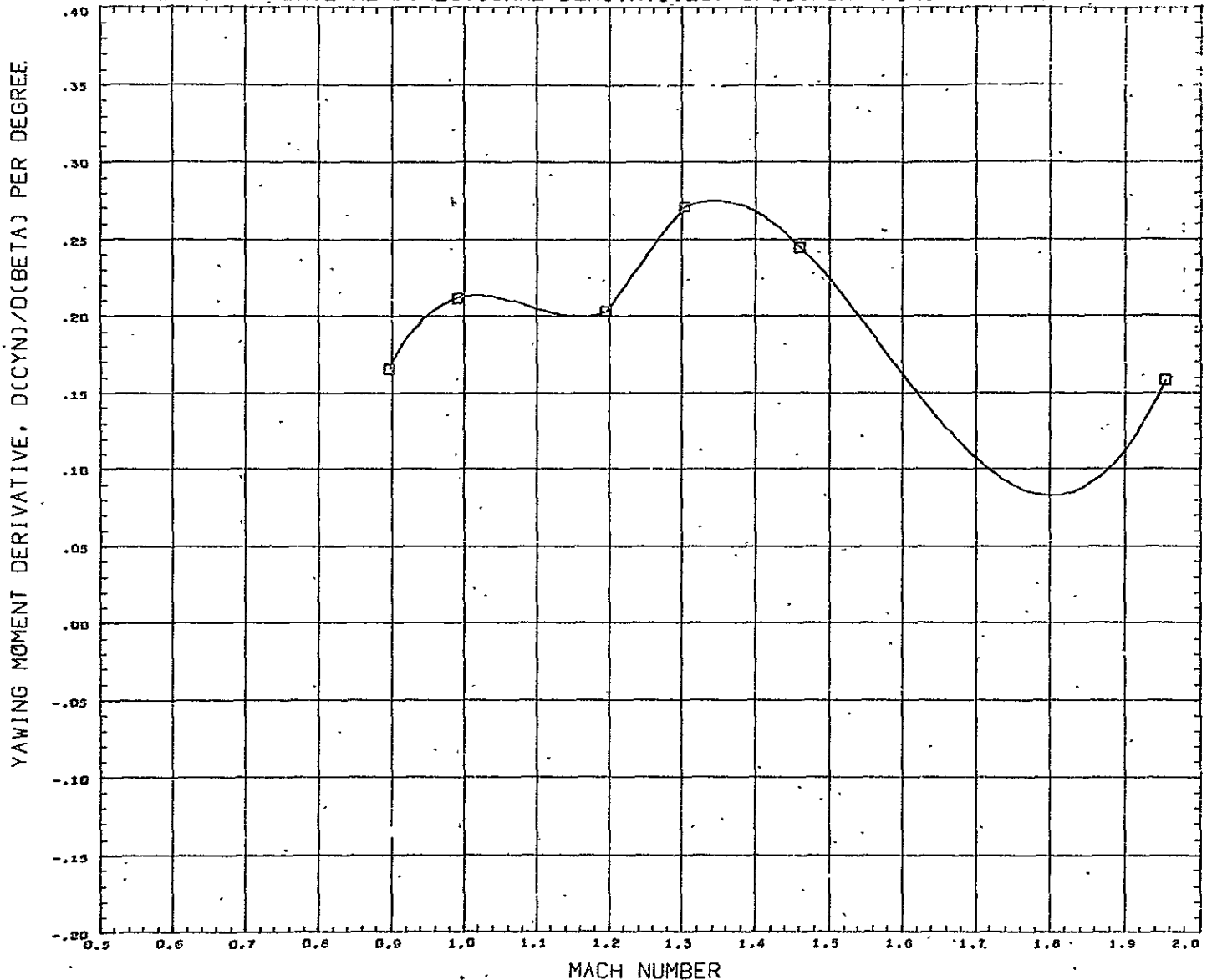


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DATA HIST. CODE *A

REFERENCE INFORMATION
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 YMRP 0.0000 INCHES
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MSFC TWT 470 LATERAL-DIRECTIONAL DERIVATIVES, CRUCIFORM FINS, PHIB=0

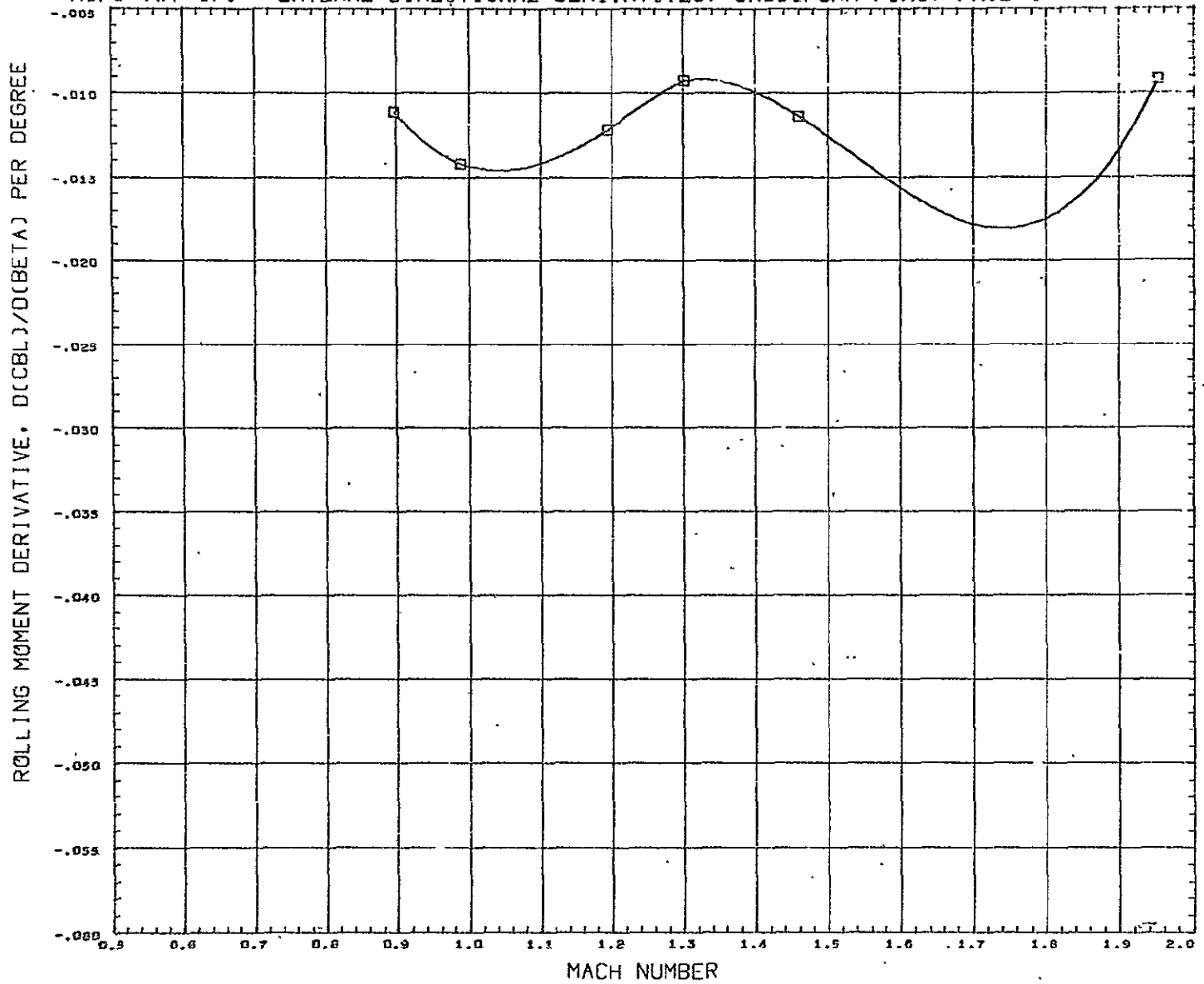


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MSFC TWT 470 LATERAL-DIRECTIONAL DERIVATIVES, CRUCIFORM FINS, PHIB=0



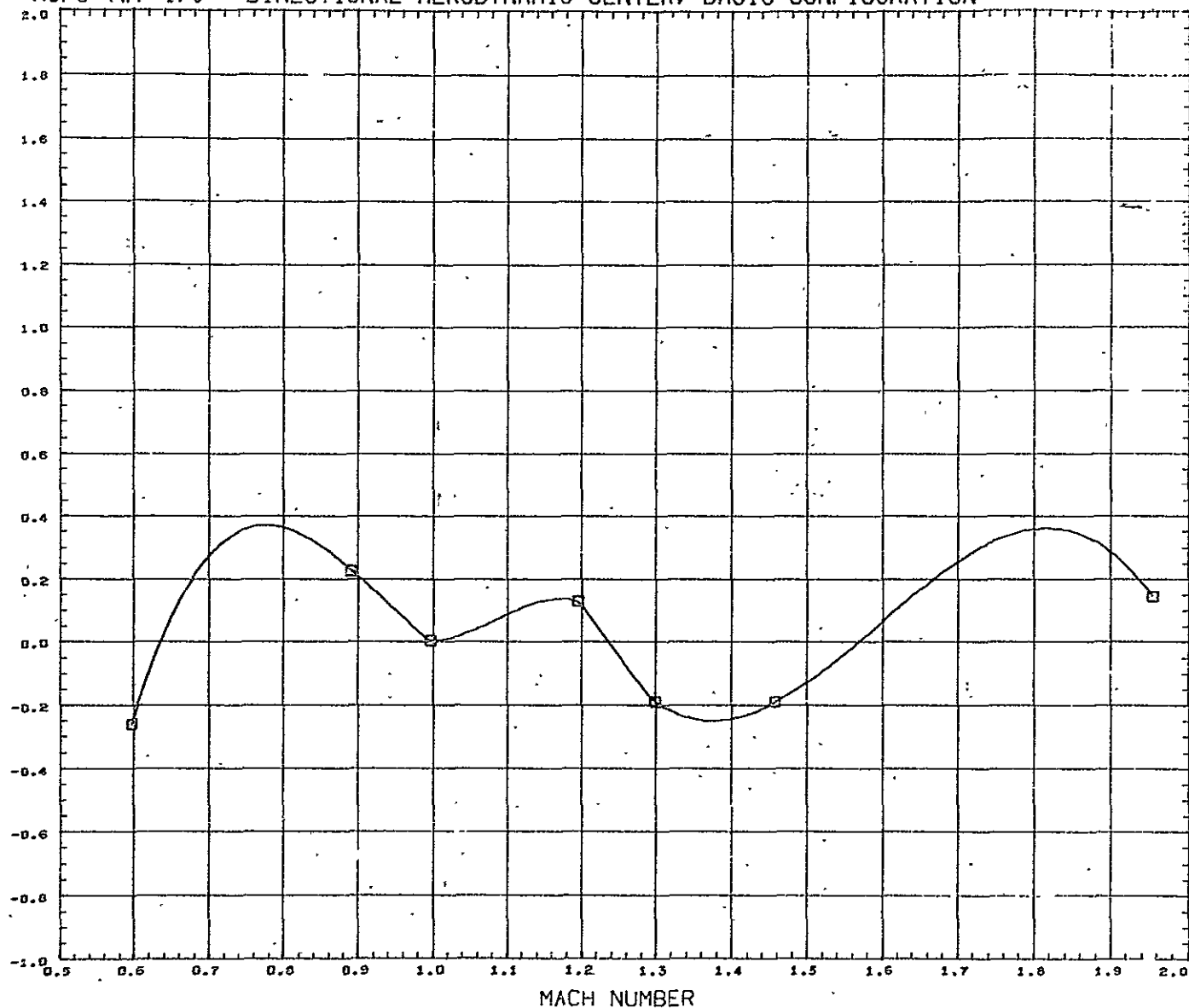
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DATA HIST. CODE *A

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 YNRP 0.0000 INCHES
 ZNRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

MSFC TWT 470 DIRECTIONAL AERODYNAMIC CENTER, BASIC CONFIGURATION

LOCATION OF DIRECTIONAL AERODYNAMIC CENTER, XAC/REFL FORWARD OF XMRP



PARAMETRIC VALUES
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 WNGINC 4.000 HTAIL 0.000
 PHIS 0.000

DATA HIST. CODE #AV

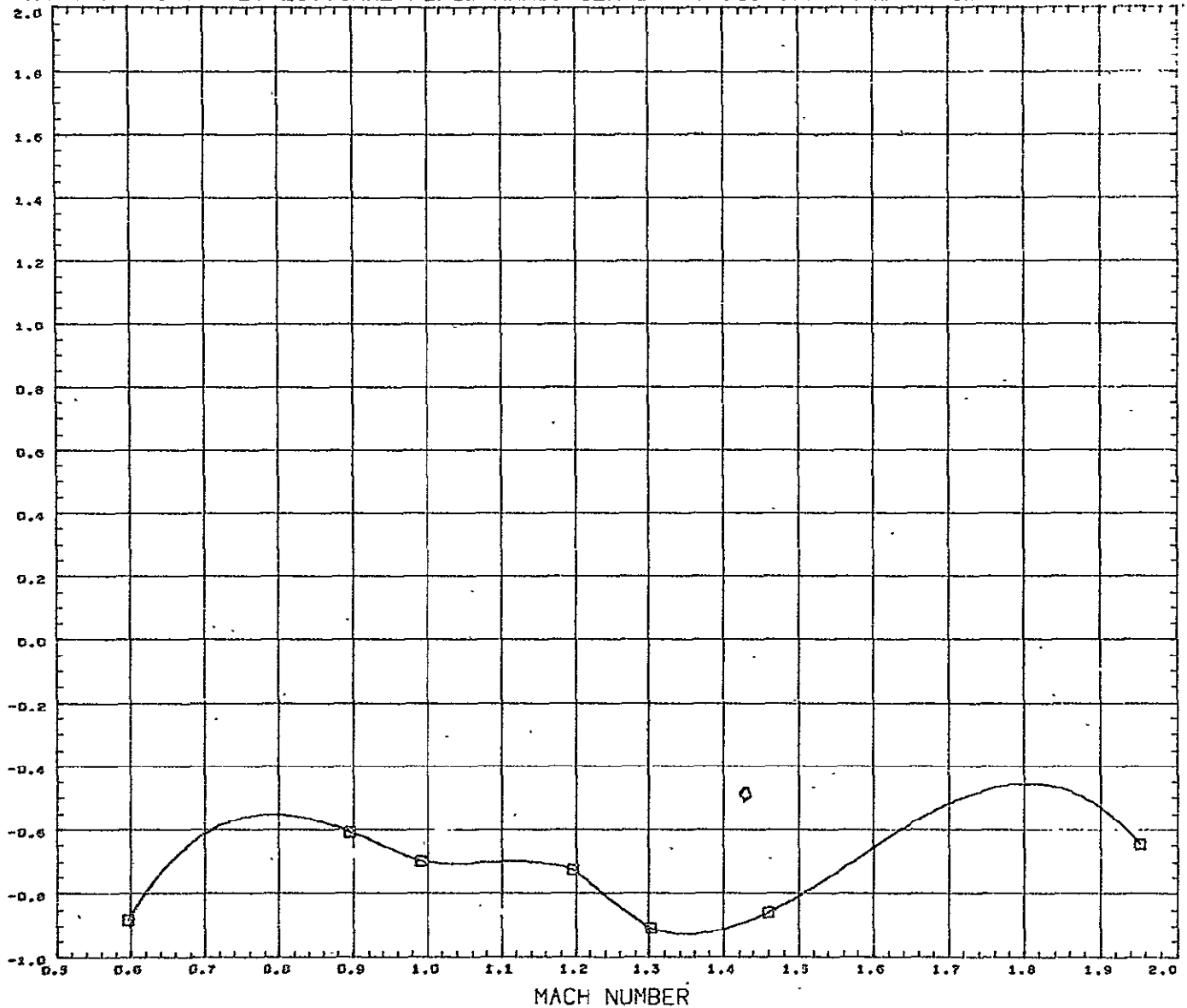
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 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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MSFC TWT 470 DIRECTIONAL AERODYNAMIC CENTER, CRUCIFORM FINS, PHIB=0

LOCATION OF DIRECTIONAL AERODYNAMIC CENTER, XAC/REFL FORWARD OF XMRP

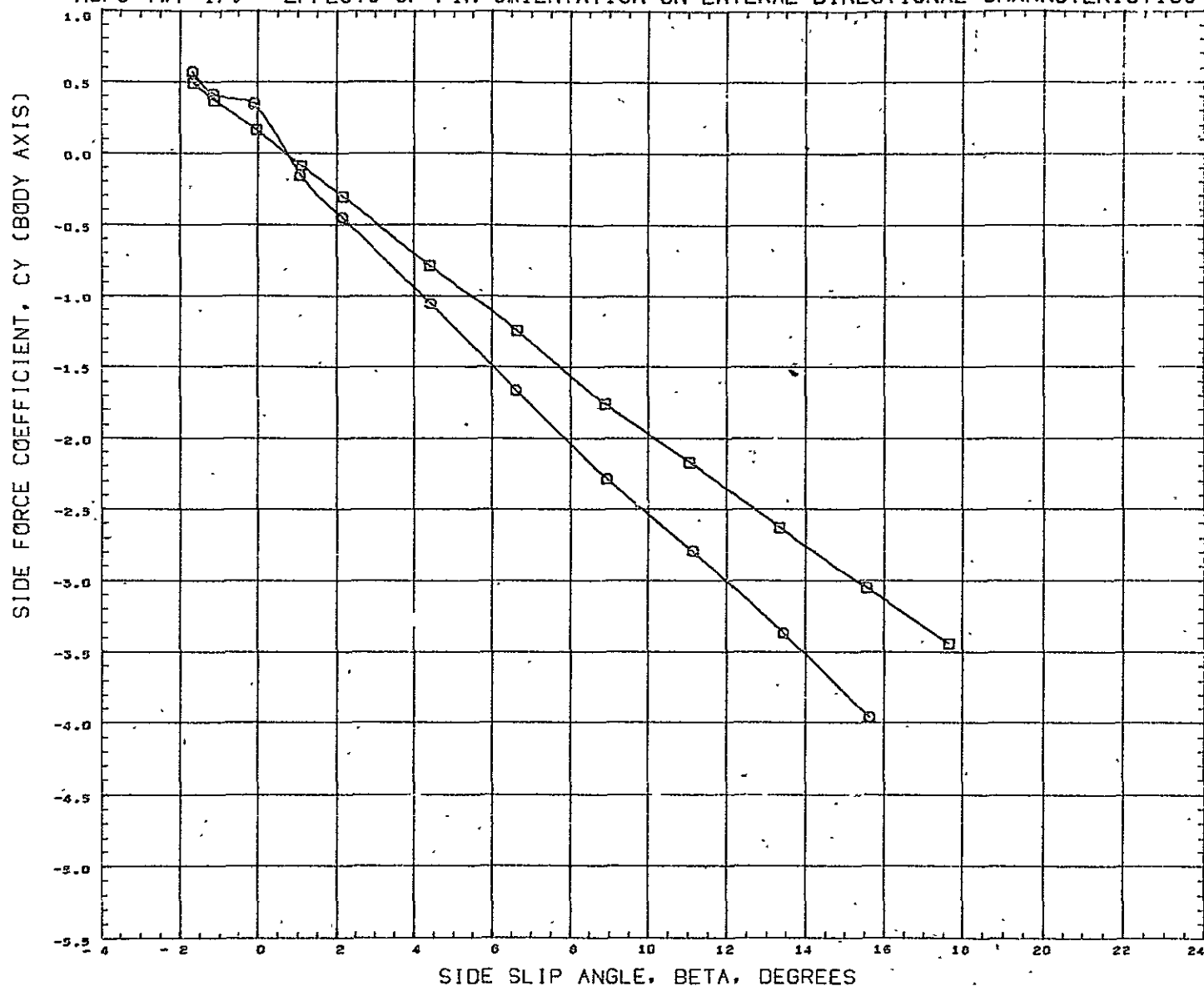


PARAMETRIC VALUES
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 PHIB 0.000

REFERENCE INFORMATION
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 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
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DATA HIST. CODE V

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS



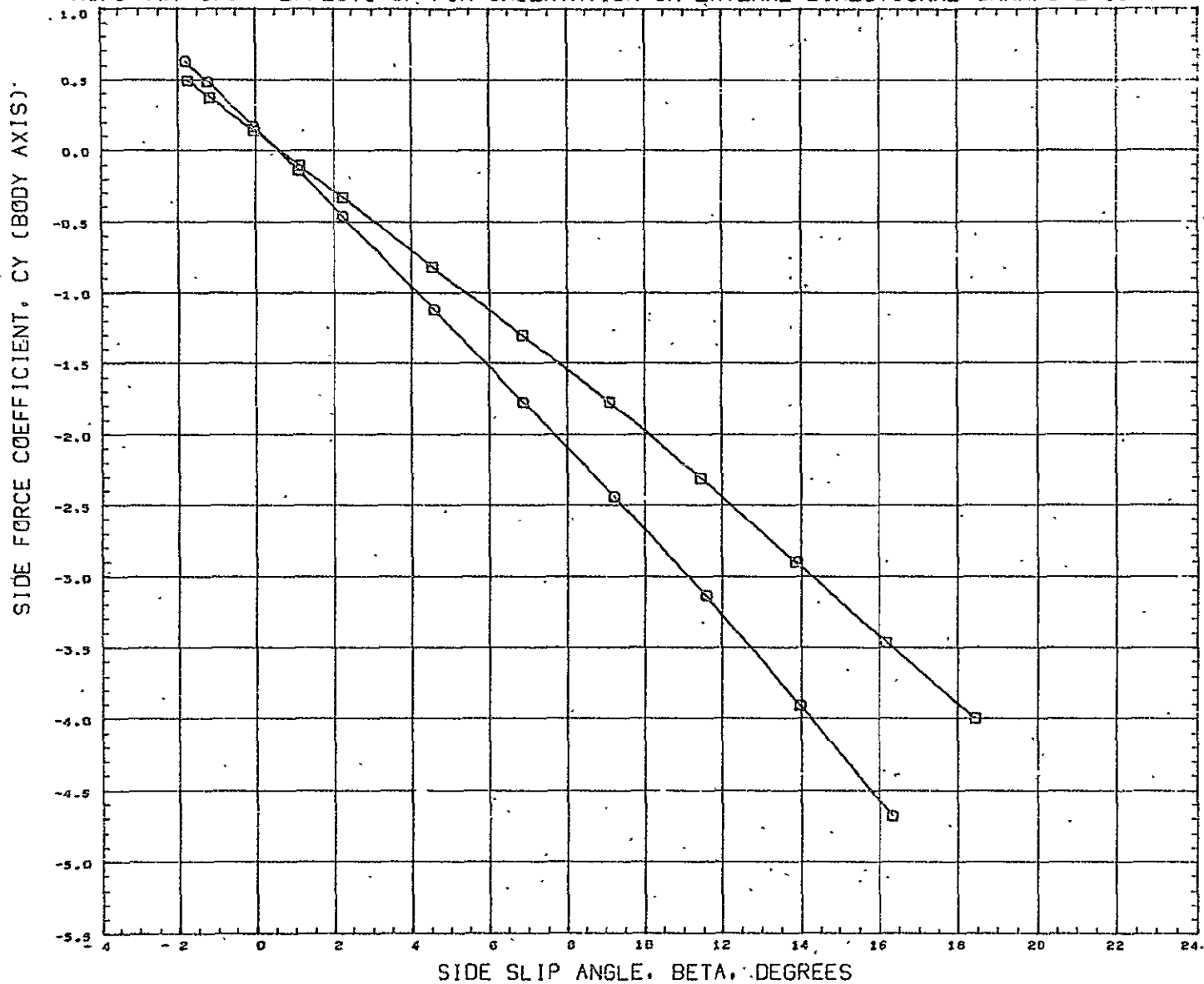
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 (J24082) □ TWT470 S-1C/GAC ORBITER BF10WHVS BASIC

PARAMETRIC VALUES
 ALPHA 0.340 ORBINC. 1.050
 WNGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
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 REFB 1.3330 INCHES
 XHRF 5.2640 INCHES
 YHRF 0.0000 INCHES
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MACH 0.596

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS



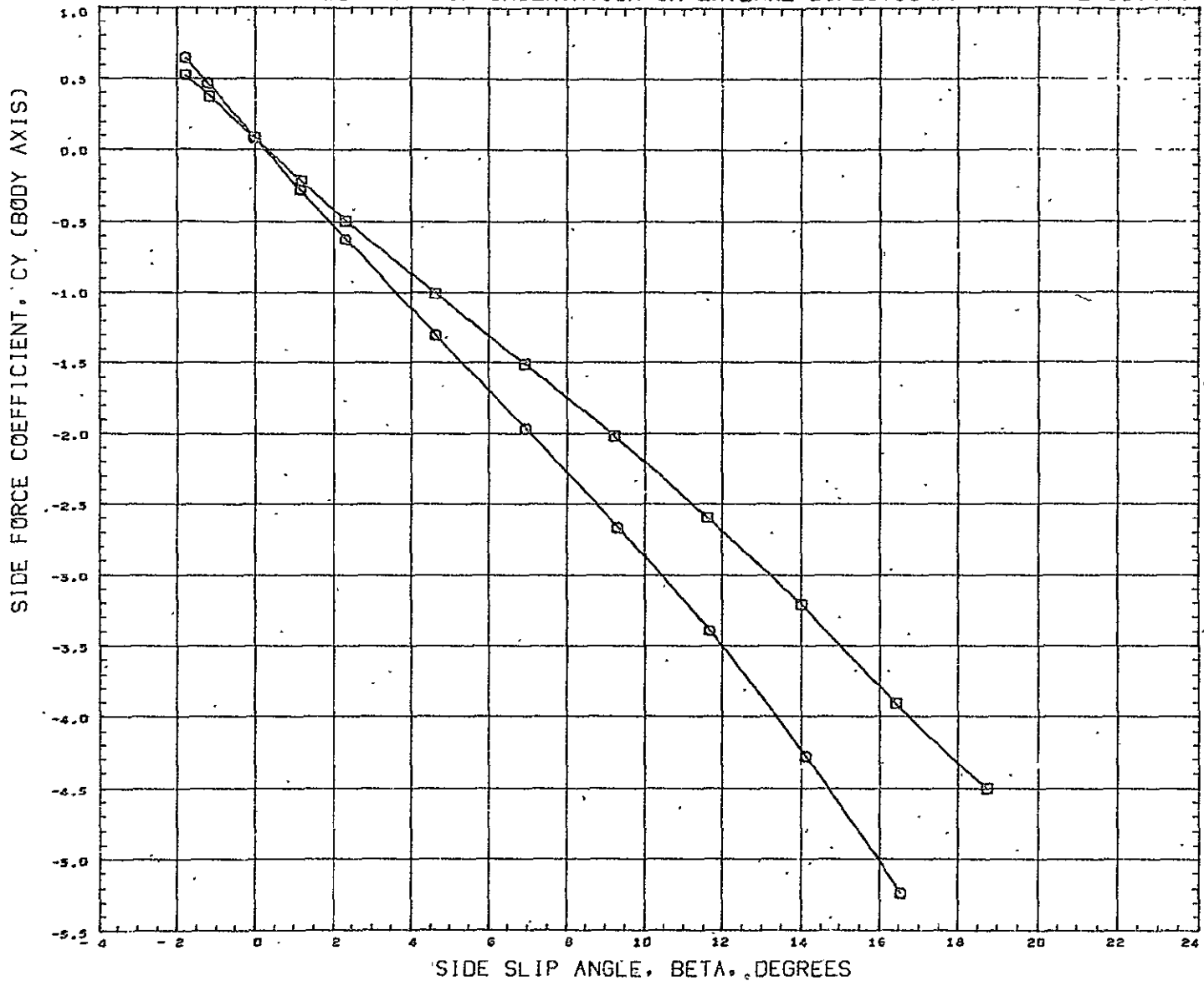
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 (J24002) \square TWT470 S-1C/6AC ORBITER BF10MHVS BASIC

PARAMETRIC VALUES
 ALPHA 0.340 ORBINC - 1.050
 WNGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
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 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

NACH 0.096

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(A24132) □ TWT470 S-IC/GAC ORBITER BF20WHVS CRUCIFORM

(J24002) □ TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

PARAMETRIC VALUES

ALPHA 0.340 ORBINC - 1.050

WINGINC 4.000 HTAIL 0.000

FHIB 0.000

REFERENCE INFORMATION

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REFB 1.3330 INCHES

XNRP 5.2640 INCHES

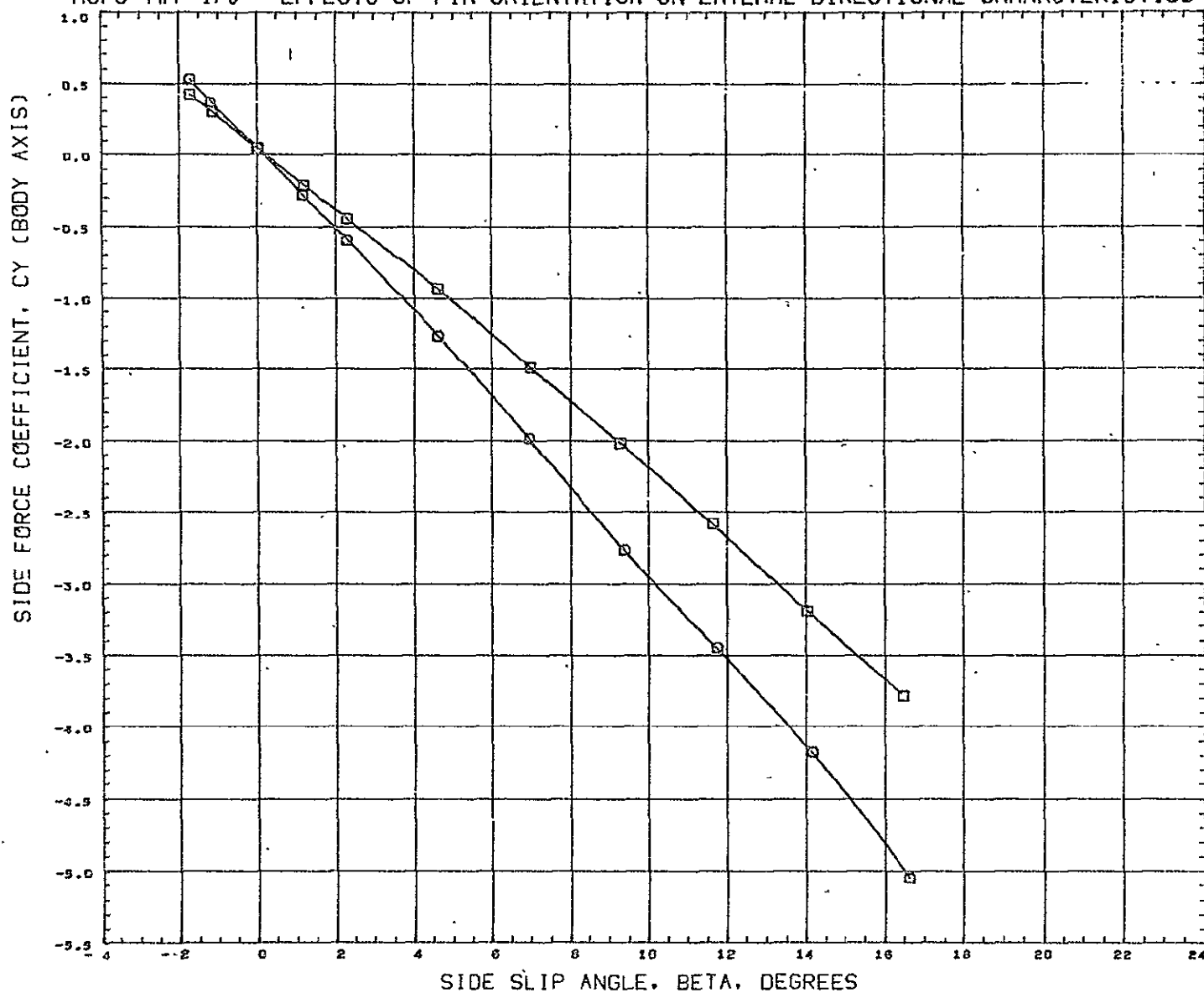
YNRP 0.0000 INCHES

ZNRP 0.0000 INCHES

SCALE 0.3366 PERCENT

MACH 0.990

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS



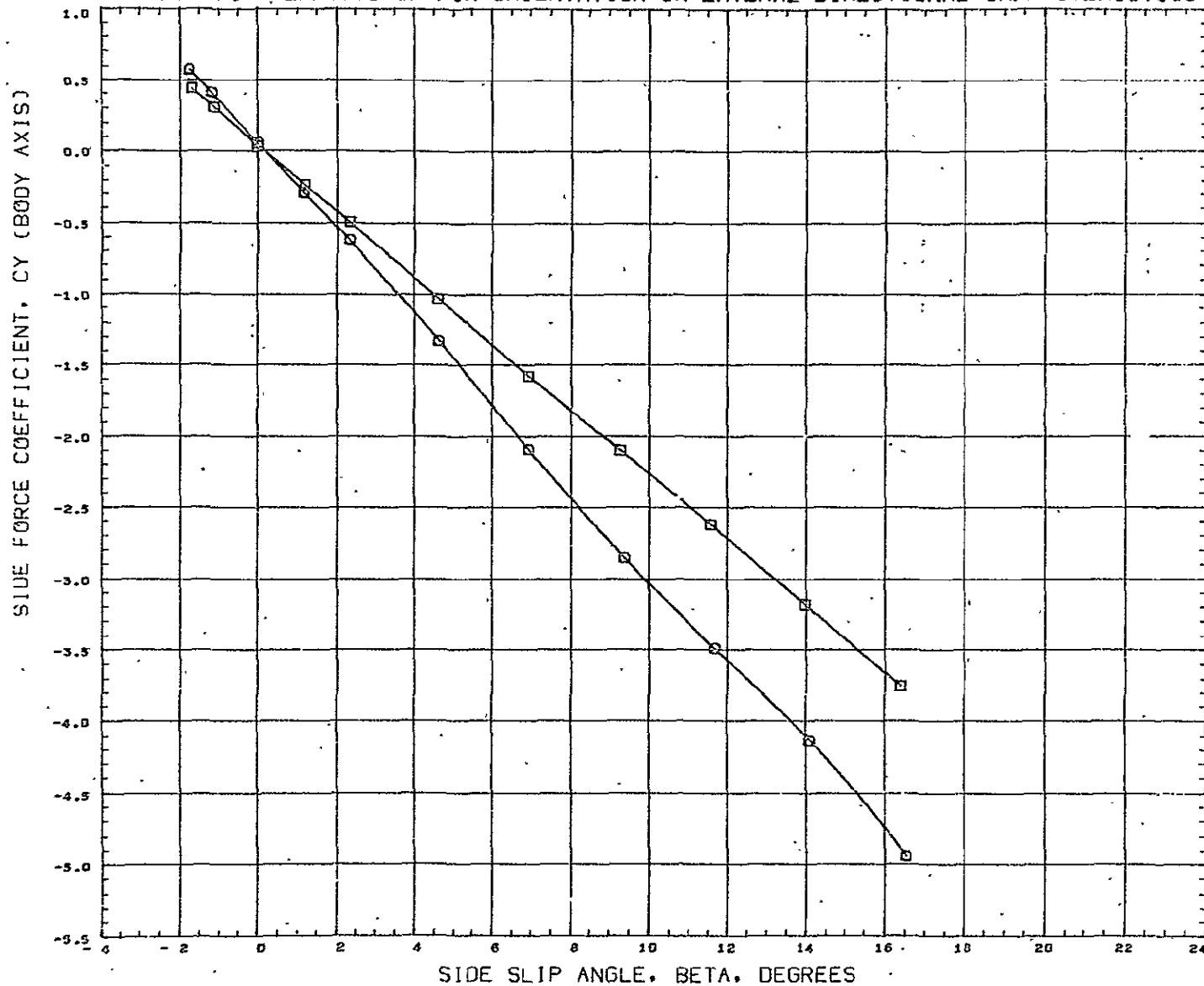
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 (J24082) \square TWT470 S-IC/GAC ORBITER BF10WHV5 BASIC

PARAMETRIC VALUES
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 WNGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
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 REFB 1.3330 INCHES
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 YHRP 0.0000 INCHES
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 SCALE 0.3366 PERCENT

HACH 1.196

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS



DATA SET SYMBOL CONFIGURATION DESCRIPTION

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J24082) □ TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

PARAMETRIC VALUES

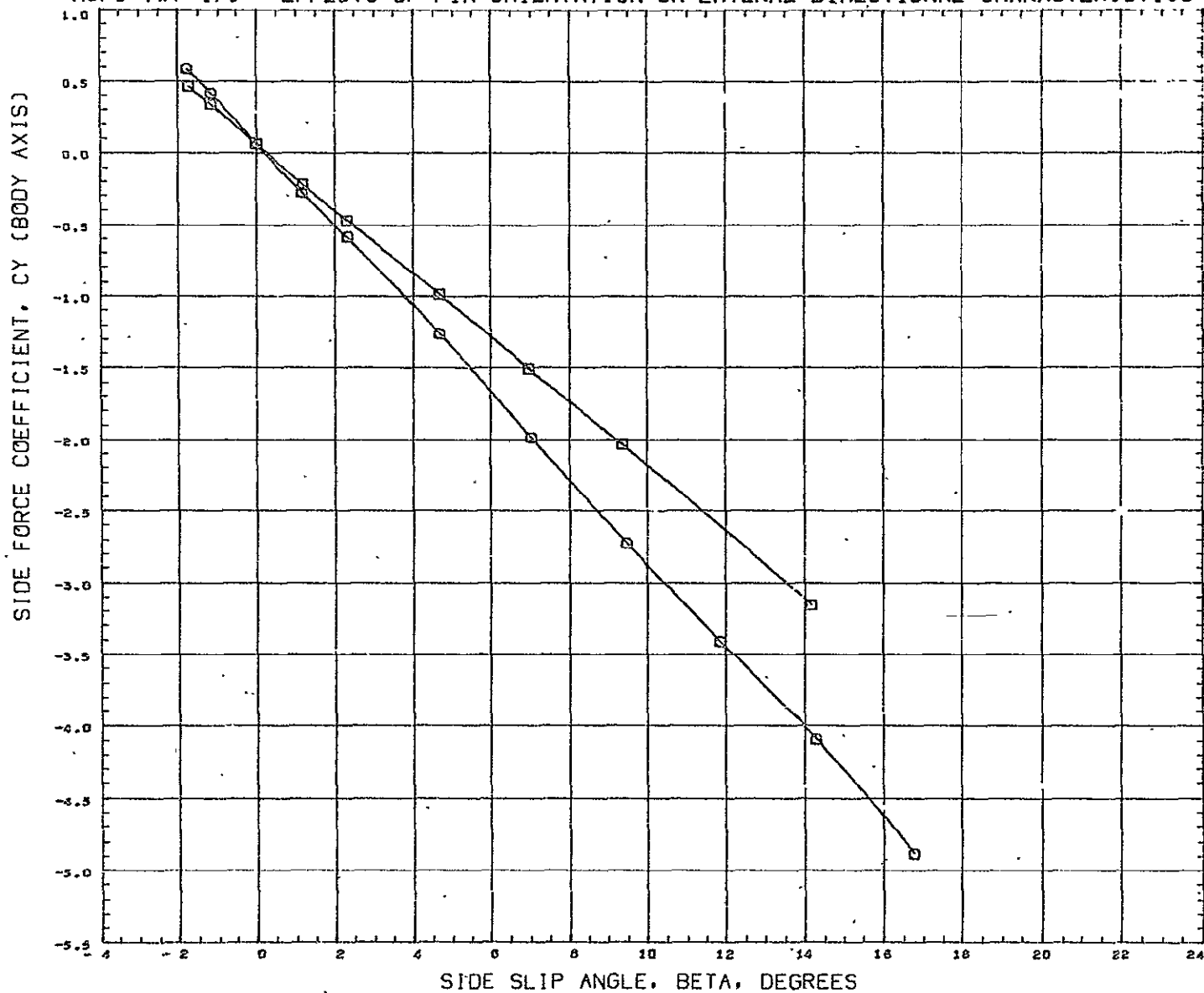
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MACH 1.302

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS



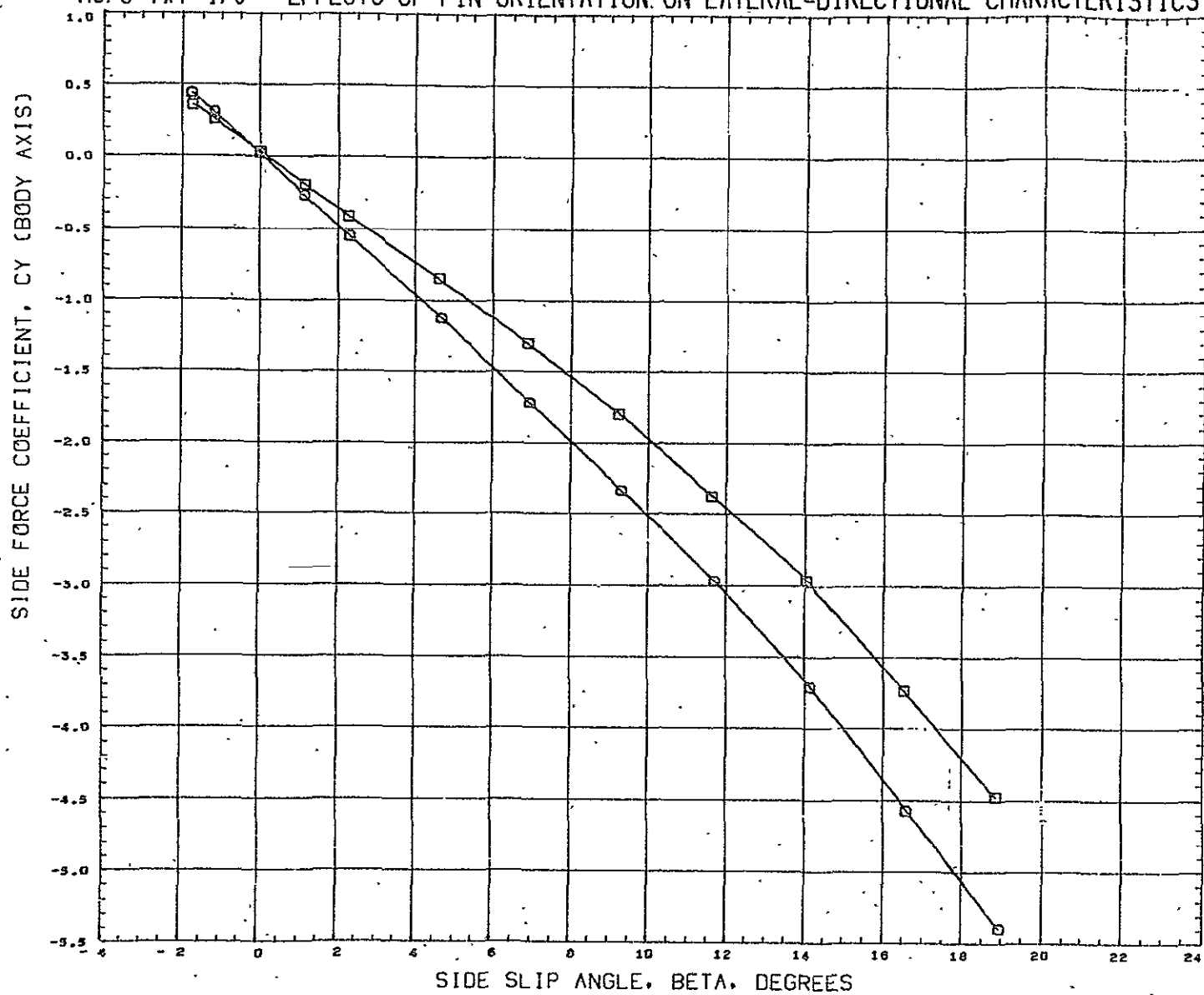
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PARAMETRIC VALUES
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WINGINC 4.000 HTAIL 0.000
FHIB 0.000

REFERENCE INFORMATION
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REFB 1.3330 INCHES
XMRP 5.2640 INCHES
YMRP 0.0000 INCHES
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MACH 1.460

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS



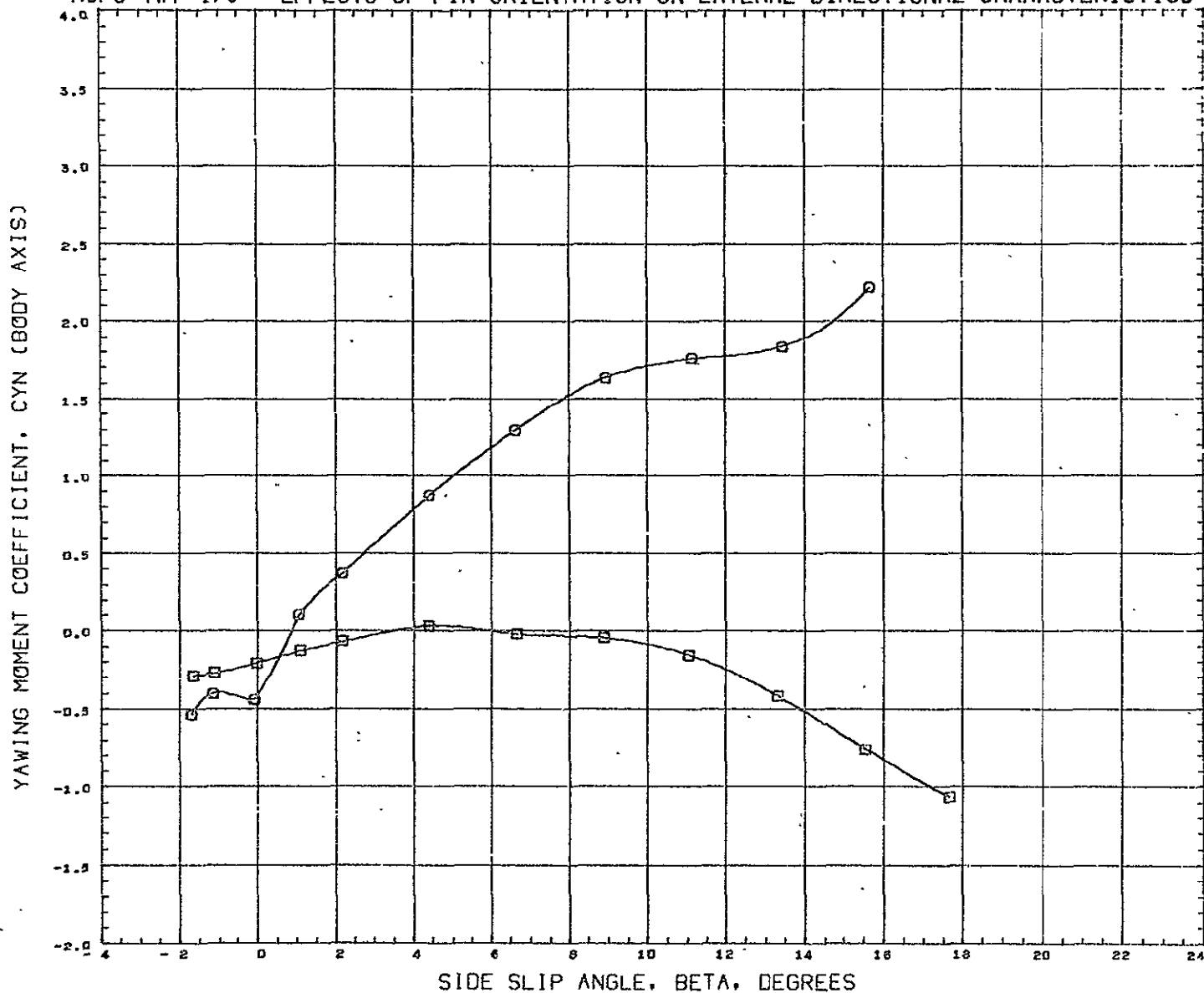
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PARAMETRIC VALUES
 ALPHA 0.340 ORBINC - 1.050
 WINGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
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MACH 1.953

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS



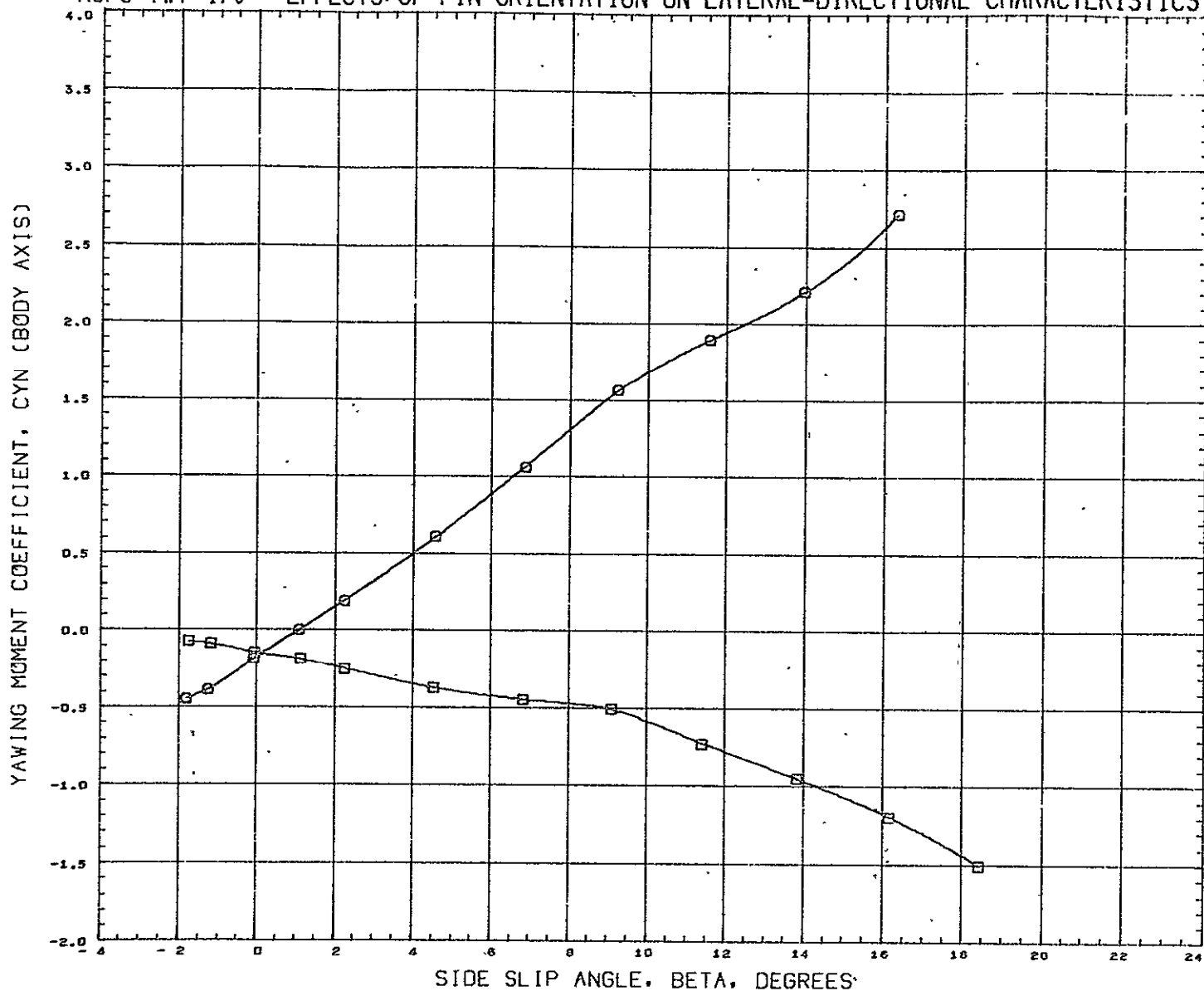
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PARAMETRIC VALUES
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 WNGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
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 REFL 1.3330 INCHES
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MACH 0.596

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS



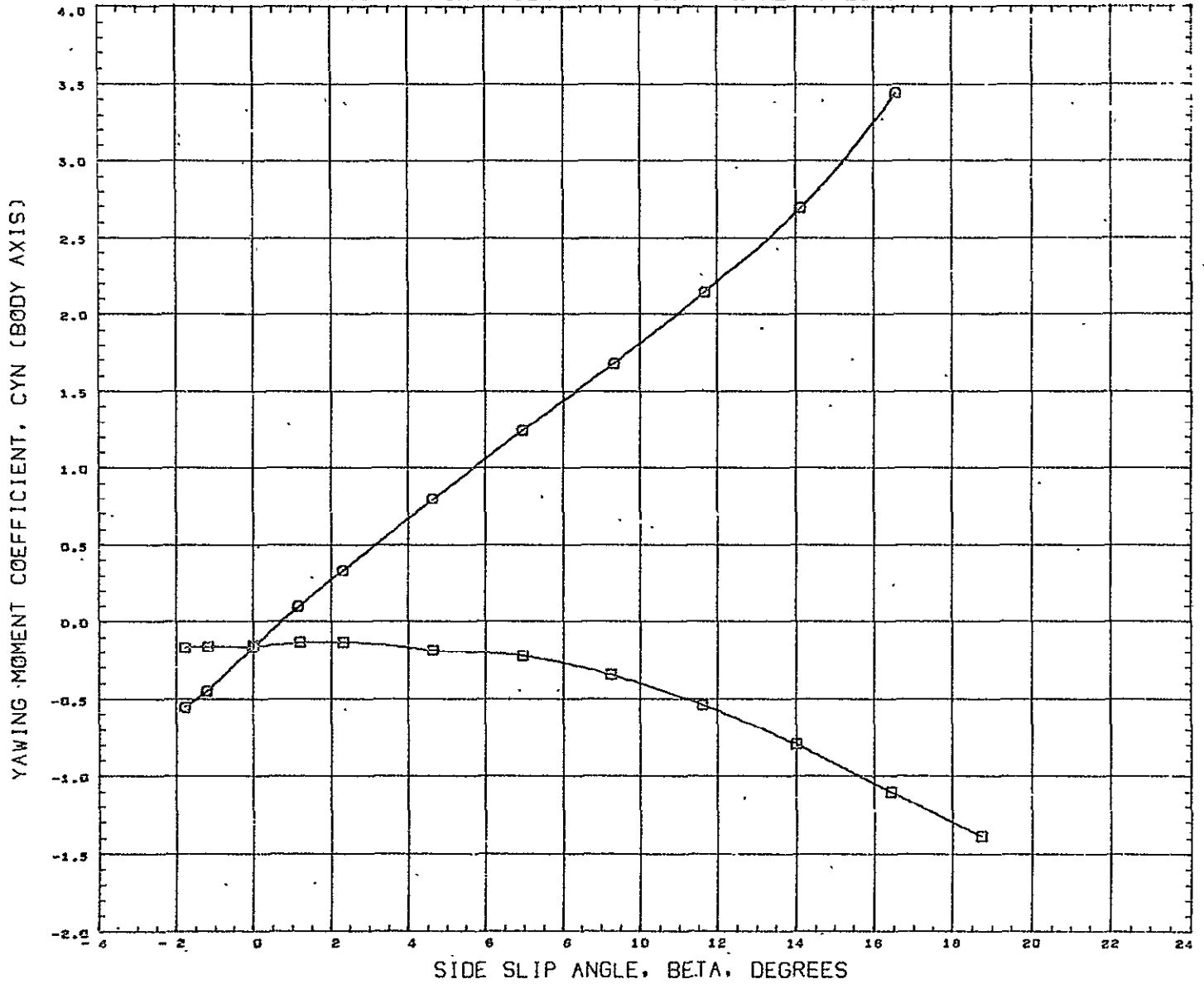
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PARAMETRIC VALUES
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 WNGINC 4.000 HTAIL 0.000
 PH18 0.000

REFERENCE INFORMATION
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HACH 0.028

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS



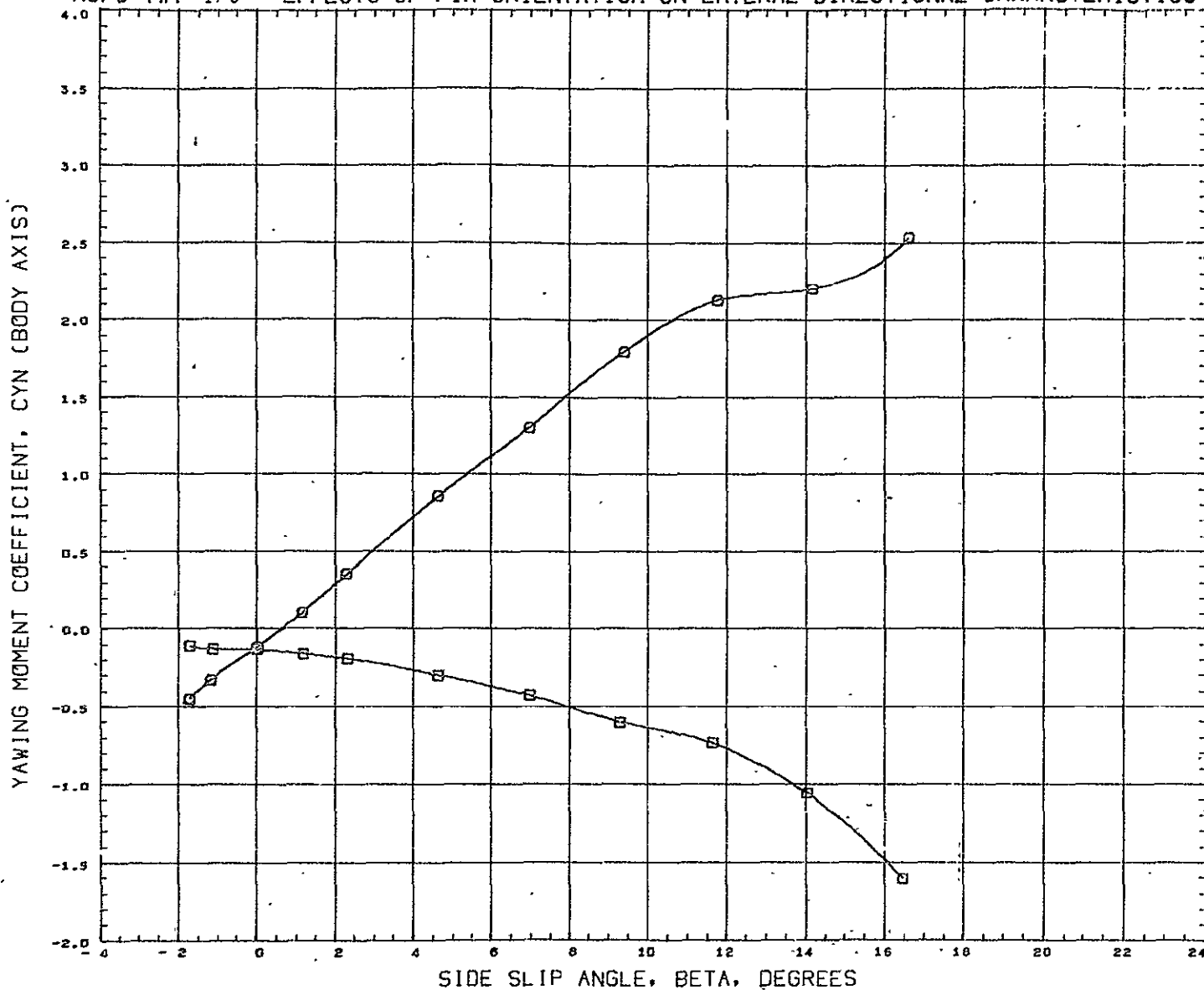
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PARAMETRIC VALUES
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 WNGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
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 REFB 1.3330 INCHES
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 YMRP 0.0000 INCHES
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MACH 0.990

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS



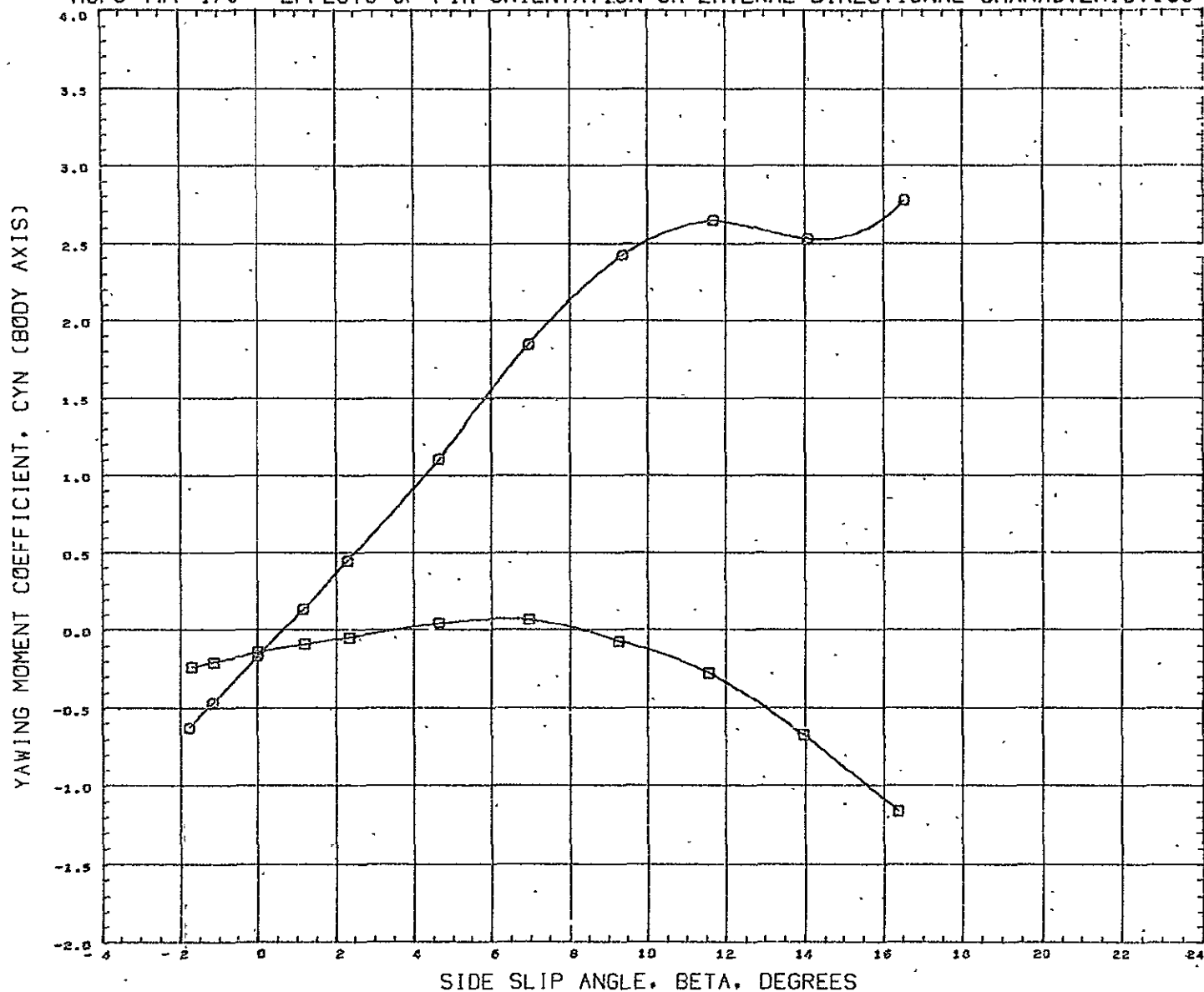
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PARAMETRIC VALUES
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 WNGINC 4.000 HTAIL 0.000
 FH18 0.000

REFERENCE INFORMATION
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 REFB 1.3330 INCHES
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 SCALE 0.3366 PERCENT

MACH 1.196

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS



DATA SET SYMBOL . CONFIGURATION DESCRIPTION

(A24132) □ TWT470 S-IC/GAC ORBITER BF20WHVS CRUCIFORM
 (J24002) □ TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

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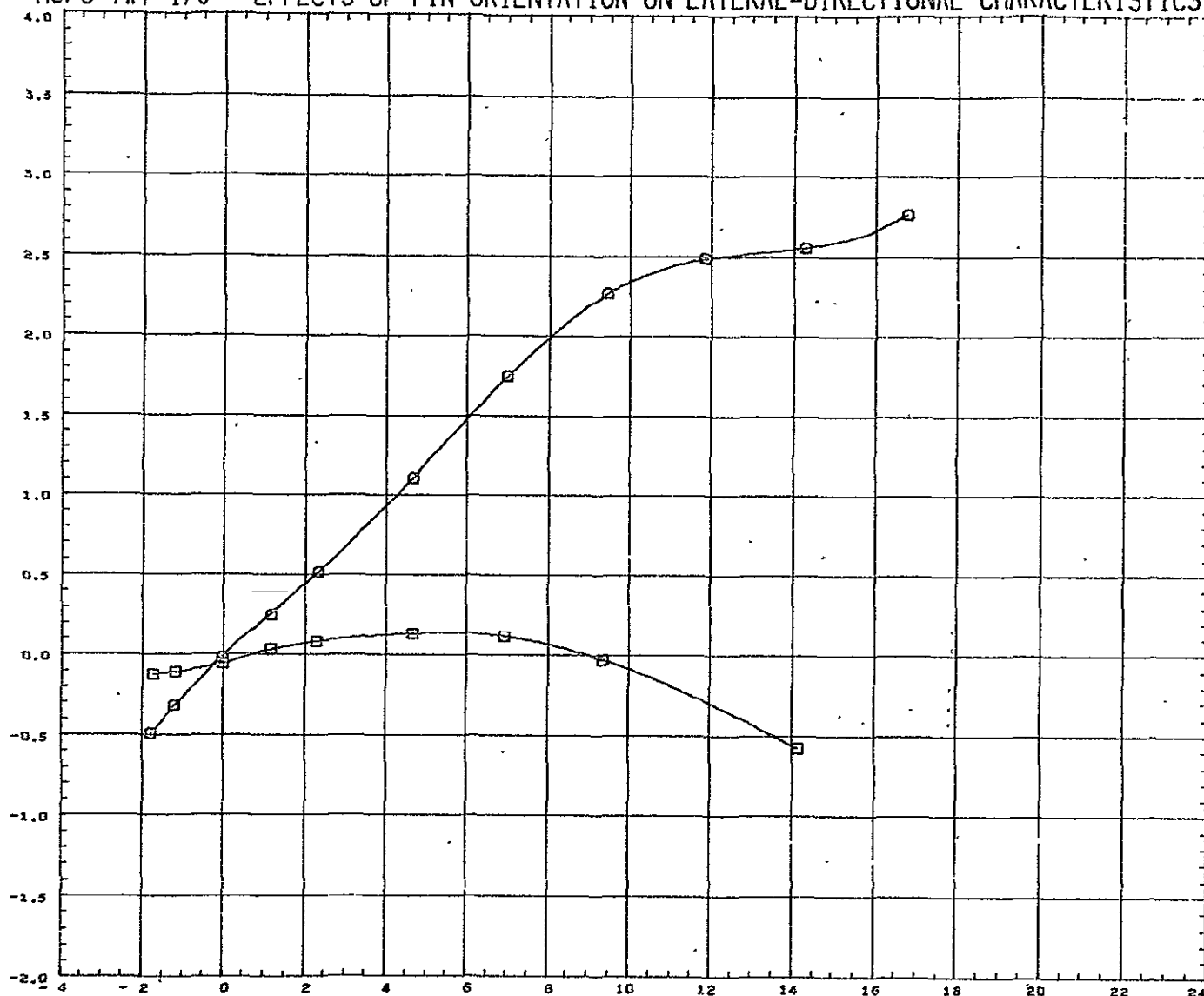
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 SCALE 0.3366 PERCENT

NACH 1.302

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS

YAWING MOMENT COEFFICIENT, CYN (BODY AXIS)



SIDE SLIP ANGLE, BETA, DEGREES

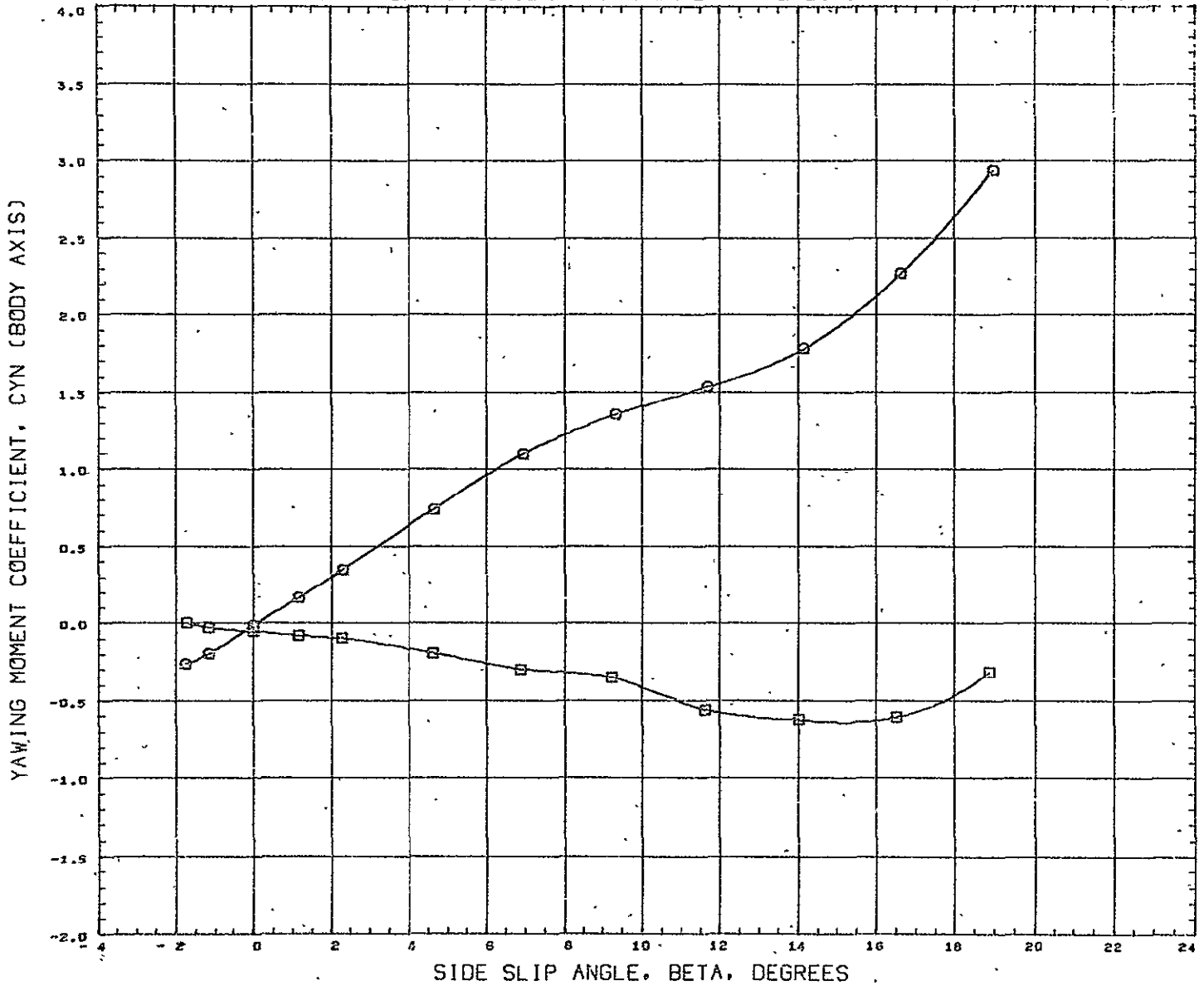
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 PHIB 0.000

REFERENCE INFORMATION
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HACH 1.460

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS



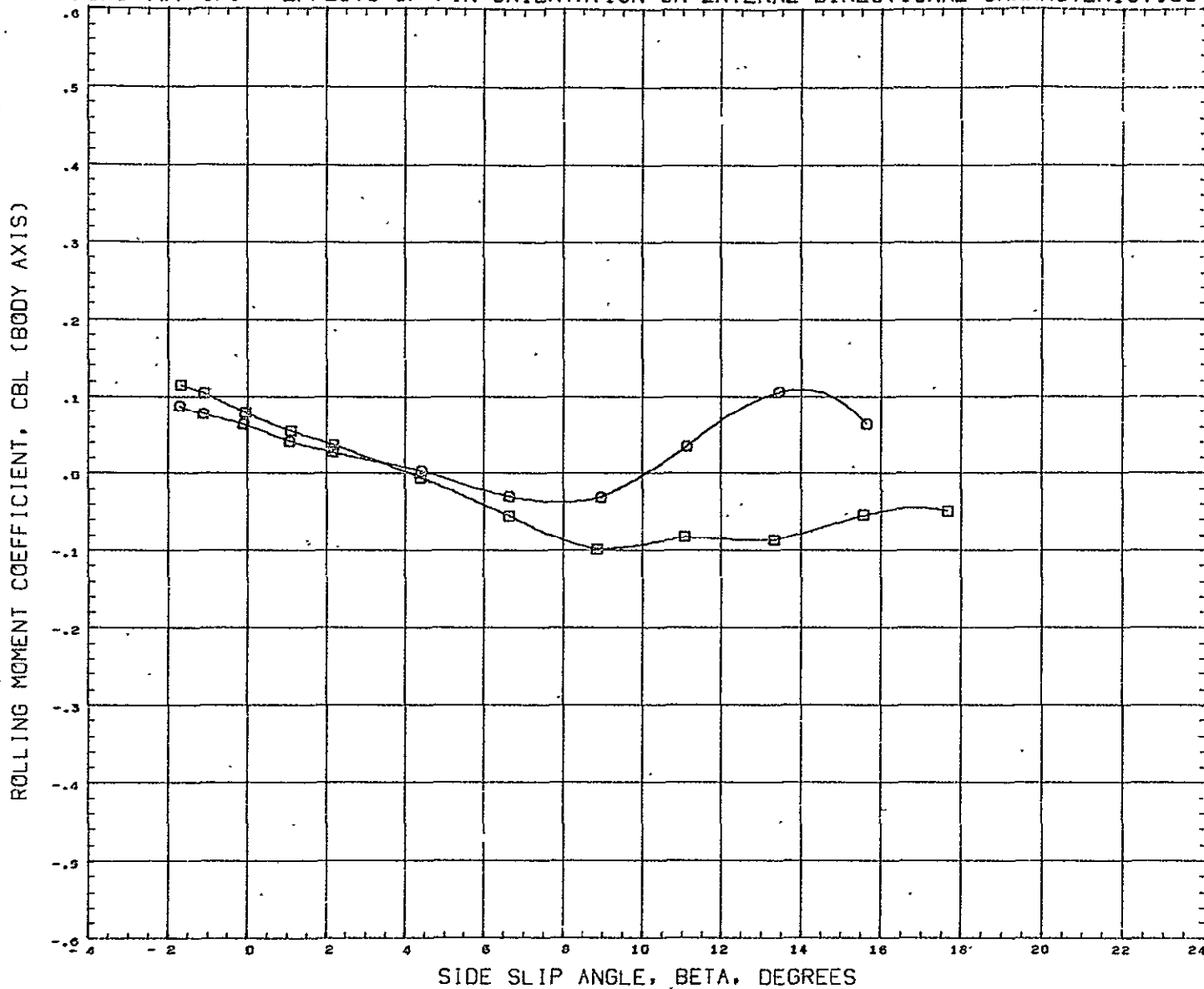
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PARAMETRIC VALUES
 ALPHA 0.340 ORBINC 1.050
 WNGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

MACH 1.953

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS



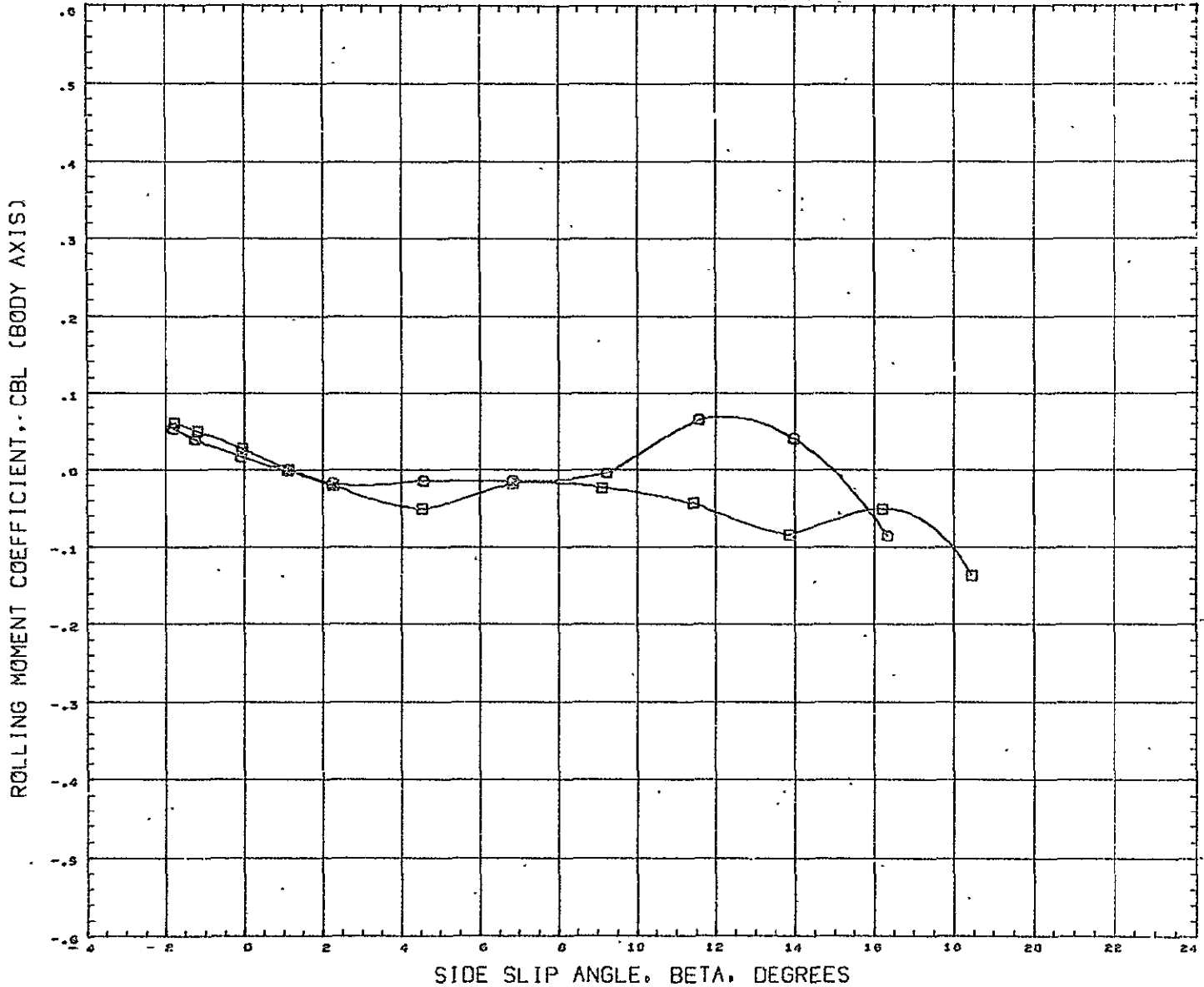
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 (A24132) □ TWT470 S-IC/GAC ORBITER BF20WHVS CRUCIFORM
 (J24082) □ TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

PARAMETRIC VALUES
 ALPHA 0.340 ORBINC - 1.050
 WNGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XHRP 5.2640 INCHES
 YHRP 0.0000 INCHES
 ZHRP 0.0000 INCHES
 SCALE 0.5366 PERCENT

HACH 0.596

MSFC TWT 470. EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS



DATA SET SYMBOL CONFIGURATION DESCRIPTION
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 (J24082) □ TWT470 5-IC/GAC ORBITER BF10MHVS BASIC

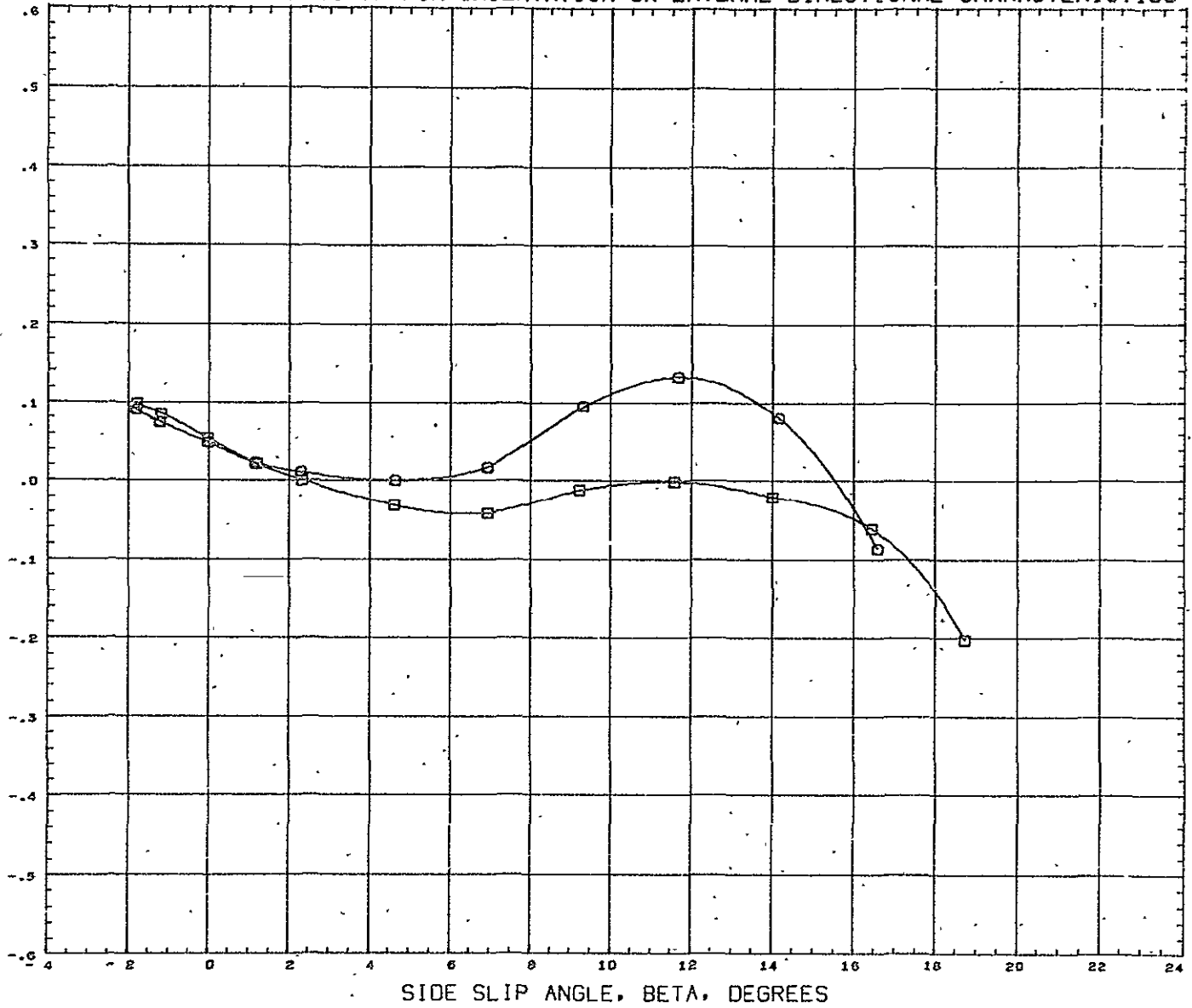
PARAMETRIC VALUES
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 WNGINC 4.000 HTAIL 0.000
 PKIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XHRP 5.2640 INCHES
 YHRP 0.0000 INCHES
 ZHRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

NACH 0.096

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS

ROLLING MOMENT COEFFICIENT, CBL (BODY AXIS)



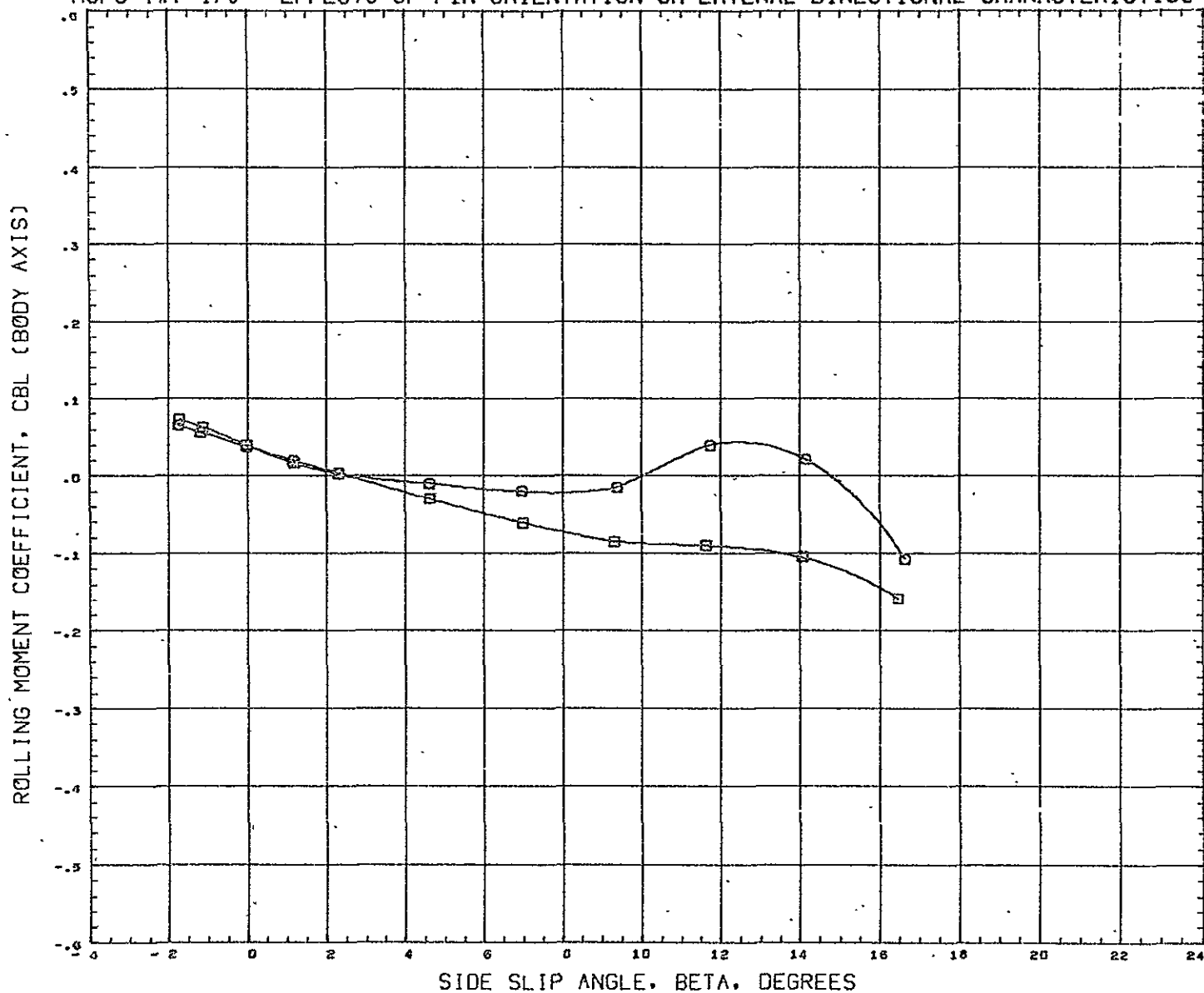
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 (J24022) □ TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

PARAMETRIC VALUES
 ALPHA 0.340 ORBINC - 1.050
 WNGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XHRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

MACH 0.990

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS



DATA SET SYMBOL CONFIGURATION DESCRIPTION
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(J24082) □ TWT470 S-1C/GAC ORBITER BF10WHVS BASIC

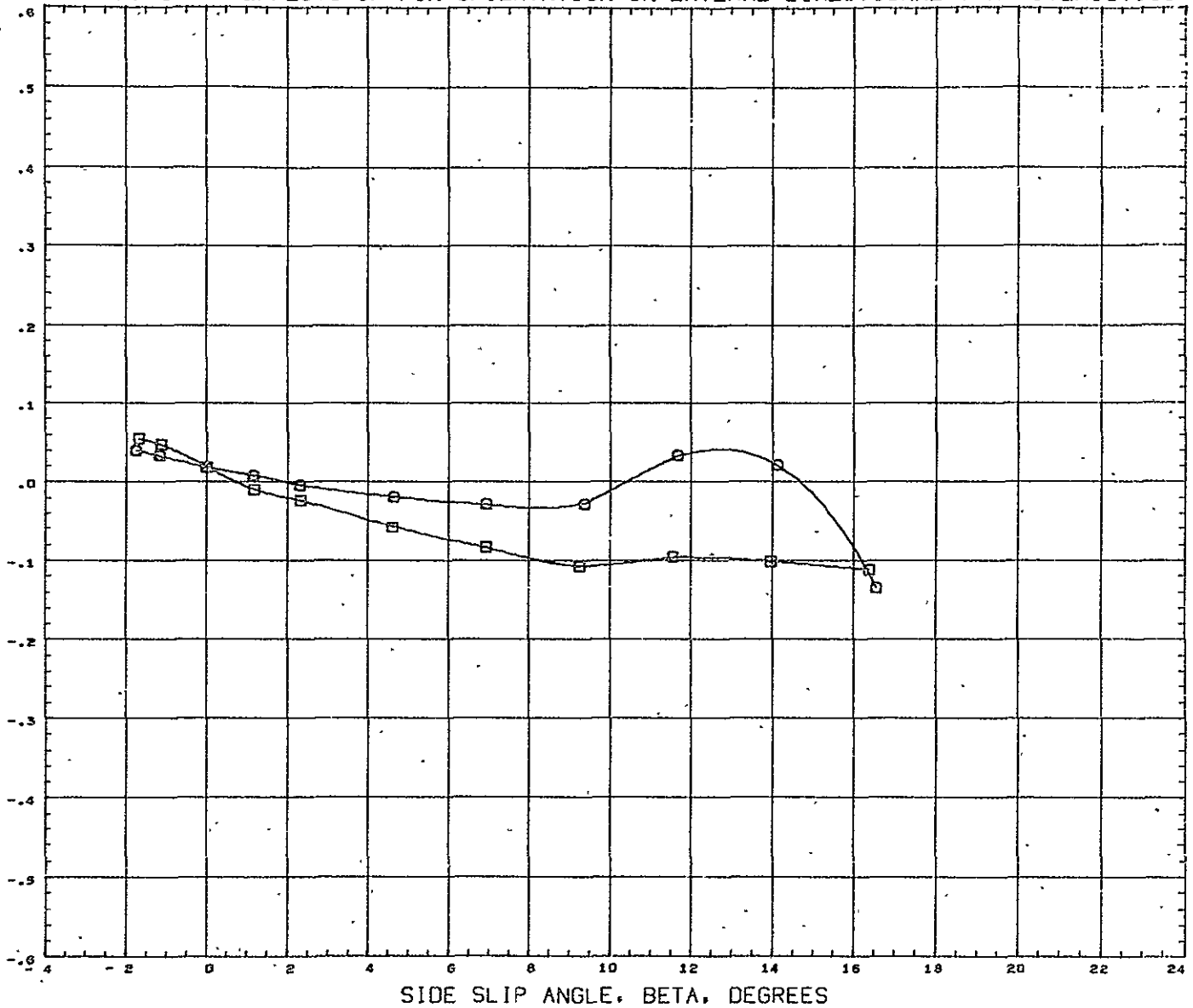
PARAMETRIC VALUES
ALPHA 0.340 ORBINC - 1.050
WNGINC 4.000 HTAIL 0.000
PHIB 0.000

REFERENCE INFORMATION
REFS 1.3960 SQ. IN.
REFL 1.3330 INCHES
REFB 1.3330 INCHES
XMRP 5.2640 INCHES
YMRP 0.0000 INCHES
ZMRP 0.0000 INCHES
SCALE 0.3366 PERCENT

HACH 1.196

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS

ROLLING MOMENT COEFFICIENT, CBL (BODY AXIS)



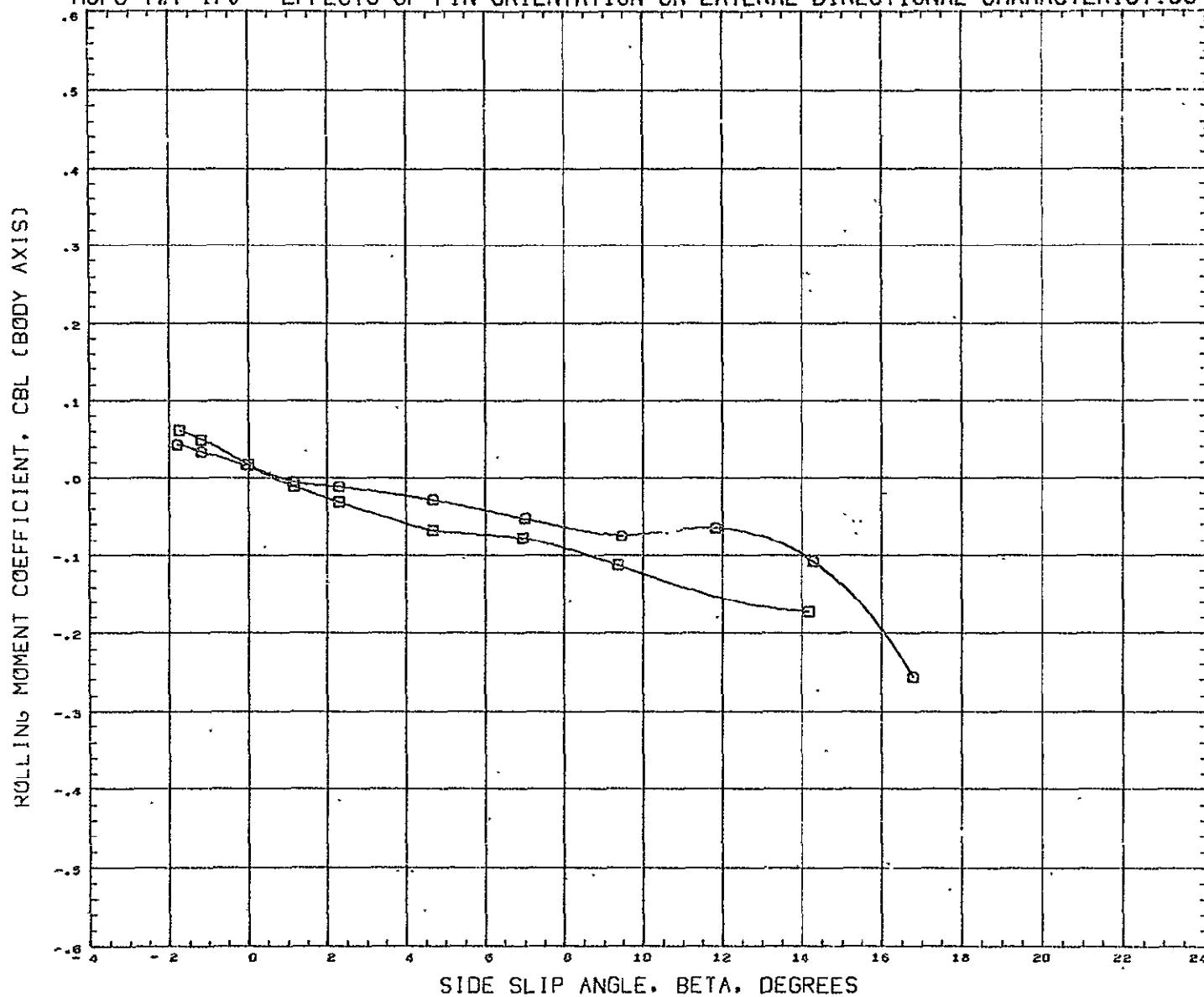
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 (J24082) □ TWT470 S-1C/GAC ORBIYER BF10WHVS BASIC

PARAMETRIC VALUES
 ALPHA 0.340 ORBINC - 1.050
 WNGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XHRP 5.2640 INCHES
 YHRP 0.0000 INCHES
 ZHRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

MACH 1.302

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (A24132) O TWT470, S-IC/GAC ORBITER BF20WHVS CRUCIFORM
 (J24002) □ TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

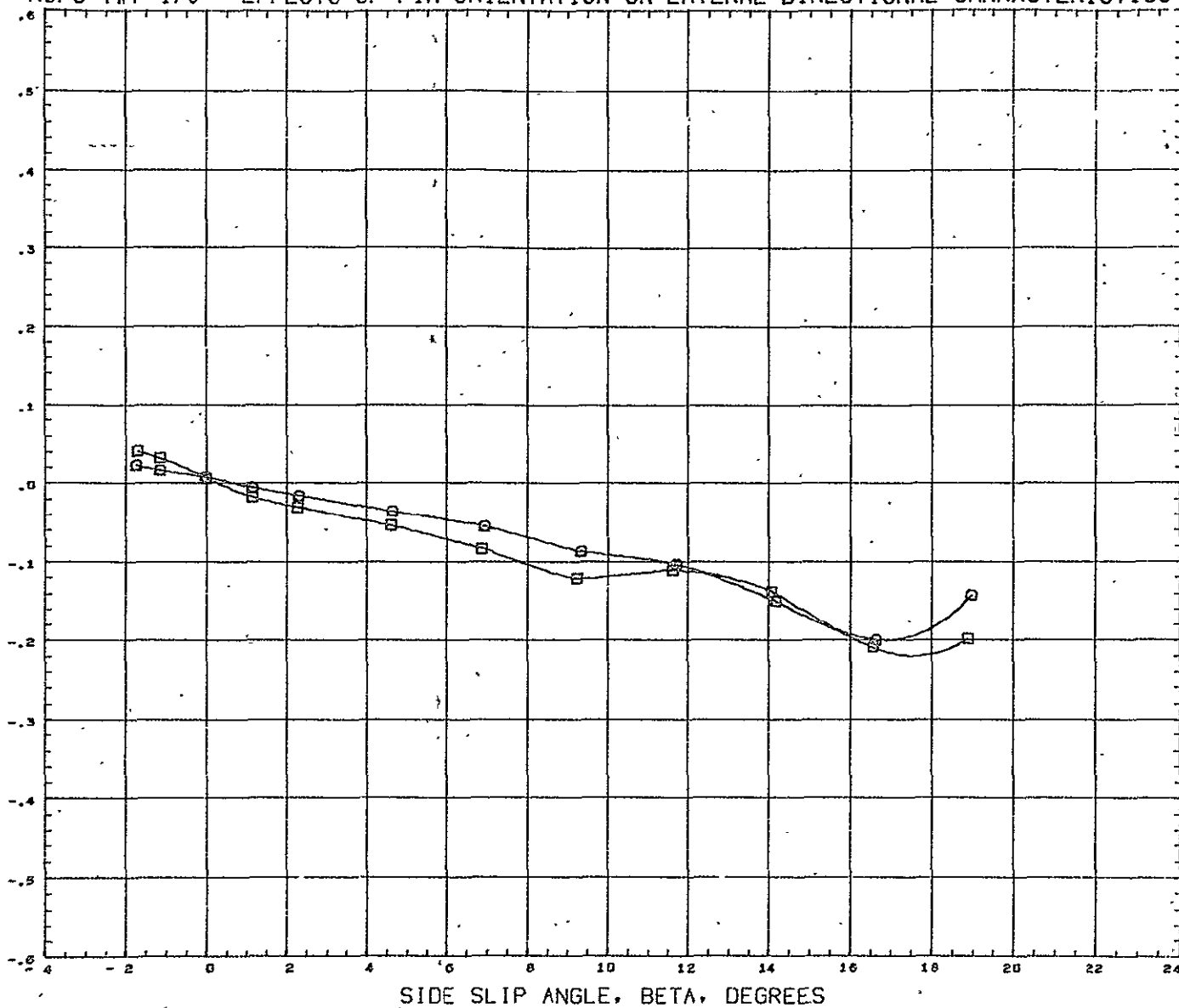
PARAMETRIC VALUES
 ALPHA 0.340 ORBINC - 1.050
 WNGINC 4.000 HTAIL 0.000
 FHB 0.000

REFERENCE INFORMATION
 REFS 1.3960 50. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

NACH 1.460

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS

ROLLING MOMENT COEFFICIENT, CBL (BODY AXIS)



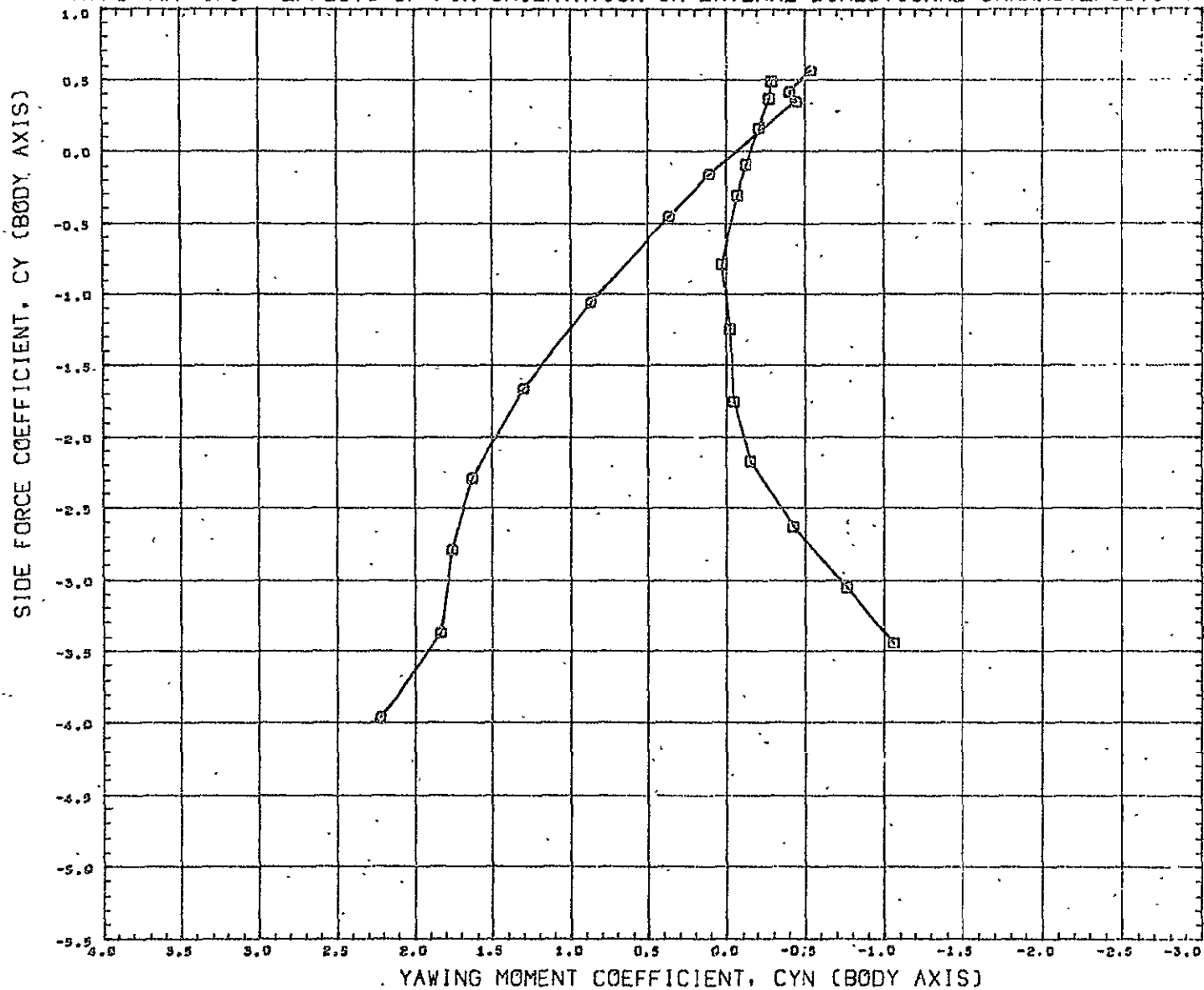
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 (A24132) □ TWT470 S-1C/GAC ORBITER BF20HVS CRUCIFORM
 (J24082) □ TWT470 S-1C/GAC ORBITER BF10HVS BASIC

PARAMETRIC VALUES
 ALPHA 0.340 ORBINC - 1.050
 WNGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XHRP 5.2640 INCHES
 YHRP 0.0000 INCHES
 ZHRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

MACH 1.953

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS



YAWING MOMENT COEFFICIENT, C_{Y_N} (BODY AXIS)

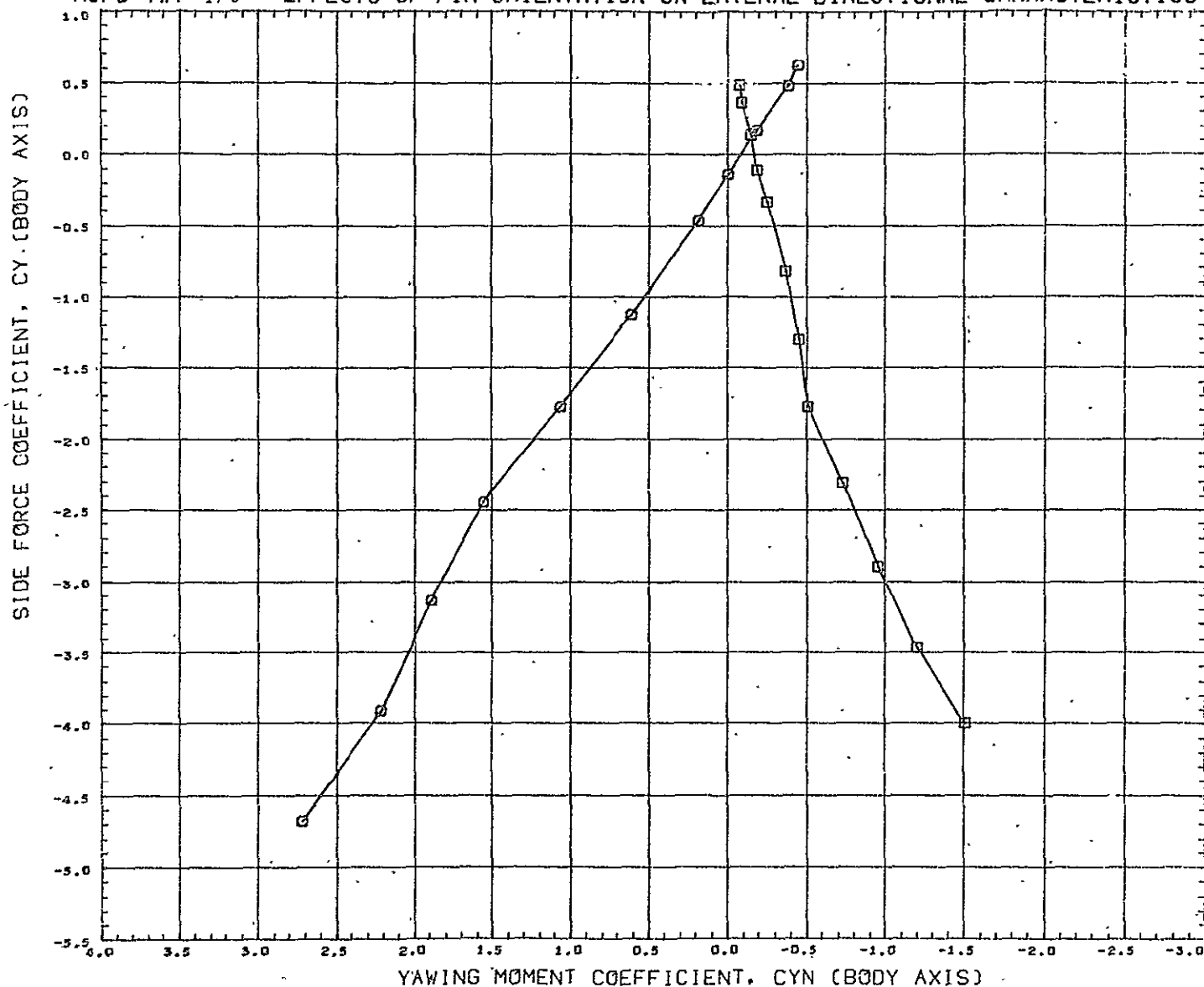
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 (A20133) □ TWT470 S-1C/GAC ORBITER BF20WHV3 CRUCIFORM
 (J24062) □ TWT470 S-1C/GAC ORBITER BF10WHV3 BASIC

PARAMETRIC VALUES
 ALPHA 0.340 ORBINC - 1.050
 WINGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XHRP 5.2640 INCHES
 YHRP 0.0000 INCHES
 ZHRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

MACH 0.590

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS



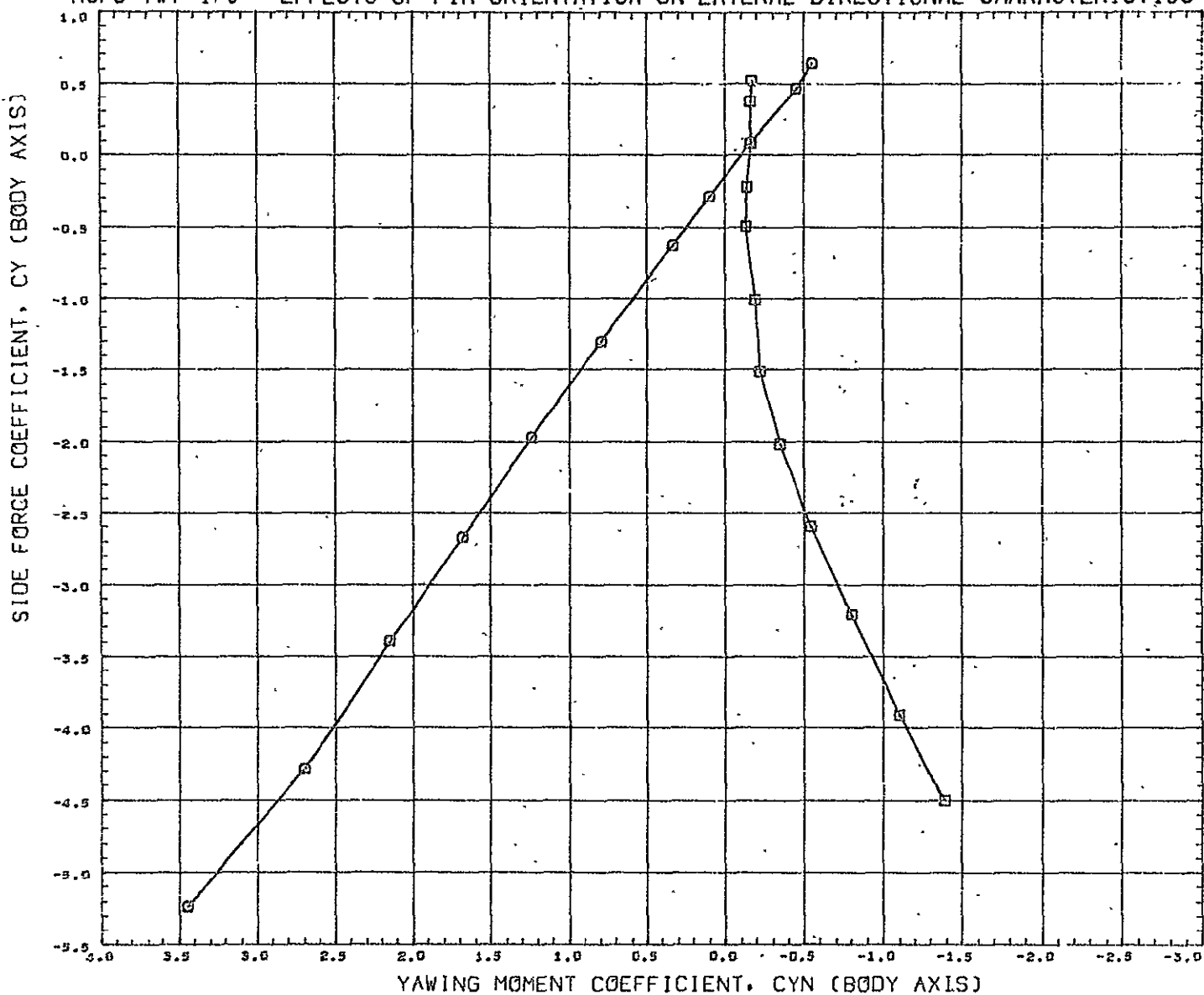
DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (A24132) □ TWT470 S-1C/GAC ORBITER BF20WHVS CRUCIFORM
 (J24082) □ TWT470 S-1C/GAC ORBITER BF10WHVS BASIC

PARAMETRIC VALUES
 ALPHA 0.340 ORBINC - 1.050
 WNGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XMRP 3.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

NACH 0.896

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS



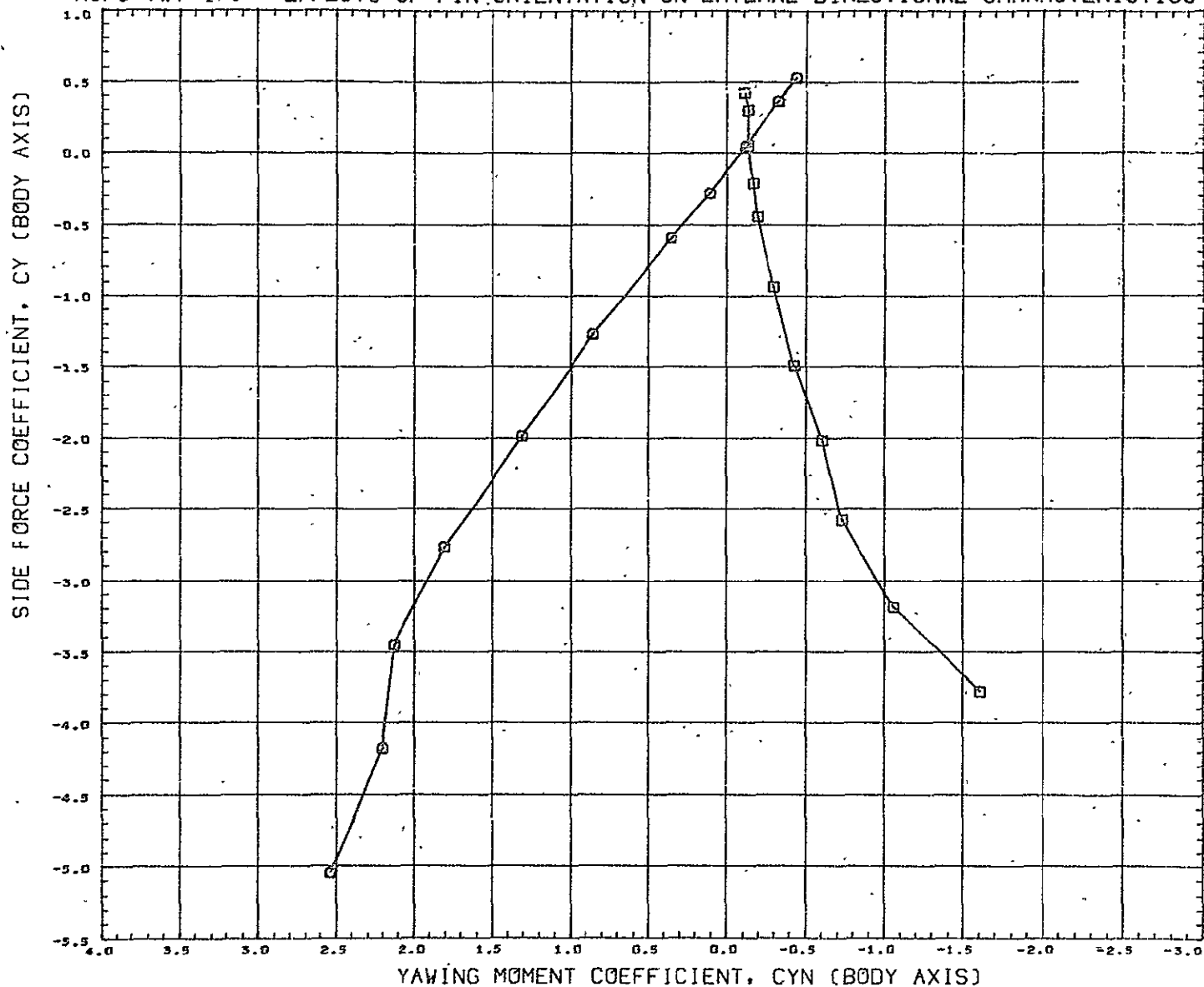
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 (A24132) \square TWT470 S-1C/GAC ORBITER BF20MHVS CRUCIFORM
 (J24002) \square TWT470 S-1C/GAC ORBITER BF10MHVS BASIC

PARAMETRIC VALUES
 ALPHA 0.340 ORBINC - 1.050
 WNGINC 4.000 HTAIL 0.000
 PHIB 0.000

REFERENCE INFORMATION
 REFS 1.3960 SQ. IN.
 REFL 1.3330 INCHES
 REFB 1.3330 INCHES
 XHRP 5.2640 INCHES
 YHRP 0.0000 INCHES
 ZHRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

HACH 0.990

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS



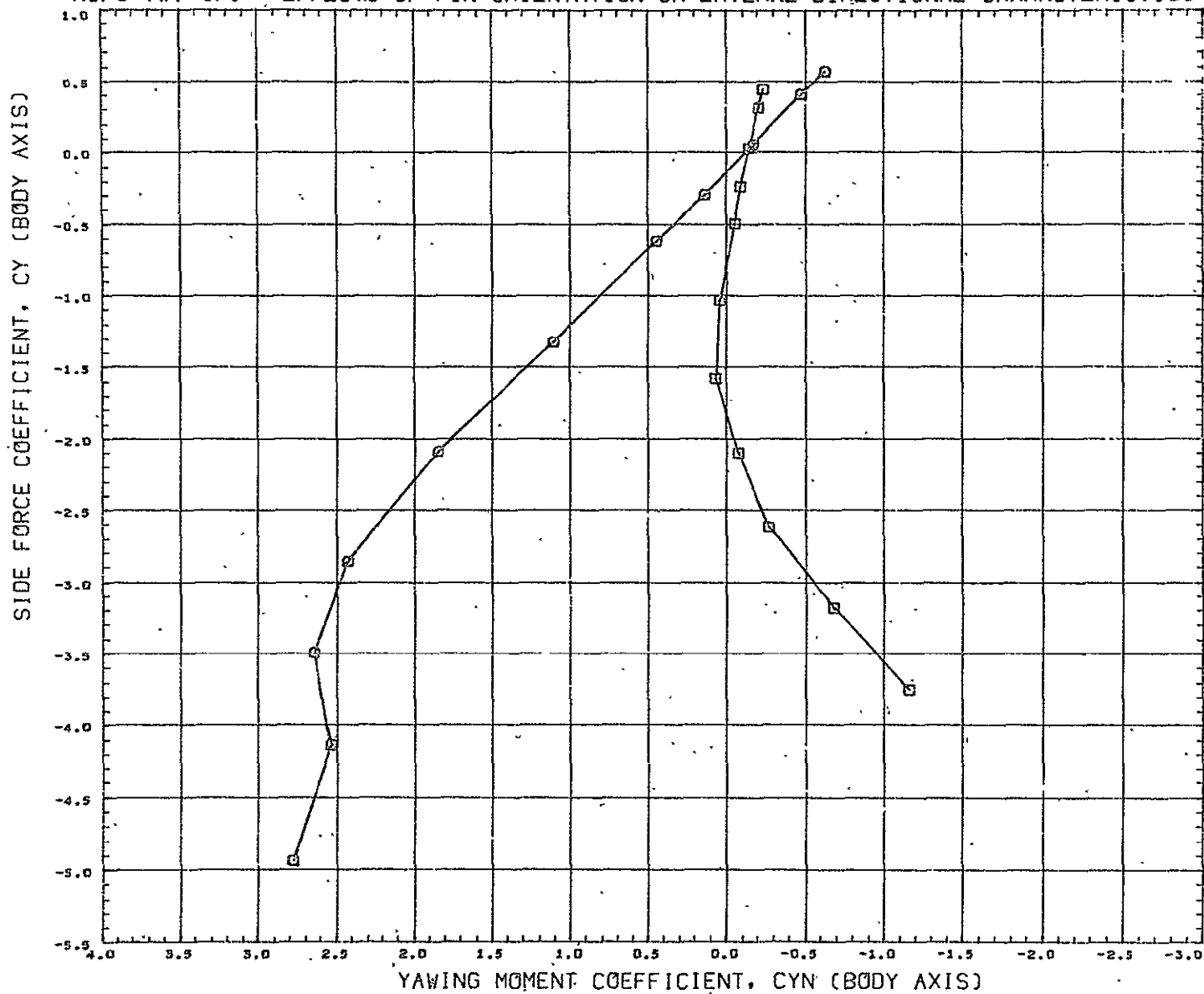
DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (A24132) □ TWT470 S-IC/GAC ORBITER BF20WHVS CRUCIFORM
 (J24002) □ TWT470 S-IC/GAC ORBITER BF10WHVS BASIC

PARAMETRIC VALUES			REFERENCE INFORMATION	
ALPHA	0.349	ORBINC -	1.050	REFS
WNGINC	4.000	HTAIL	0.000	REFL
PHIB	0.000			REFB
				XMRP
				YMRP
				ZMRP
				SCALE

1.3960 SQ. IN.
 1.3330 INCHES
 1.3330 INCHES
 5.2640 INCHES
 0.0000 INCHES
 0.0000 INCHES
 0.3366 PERCENT

MACH 1.196

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS

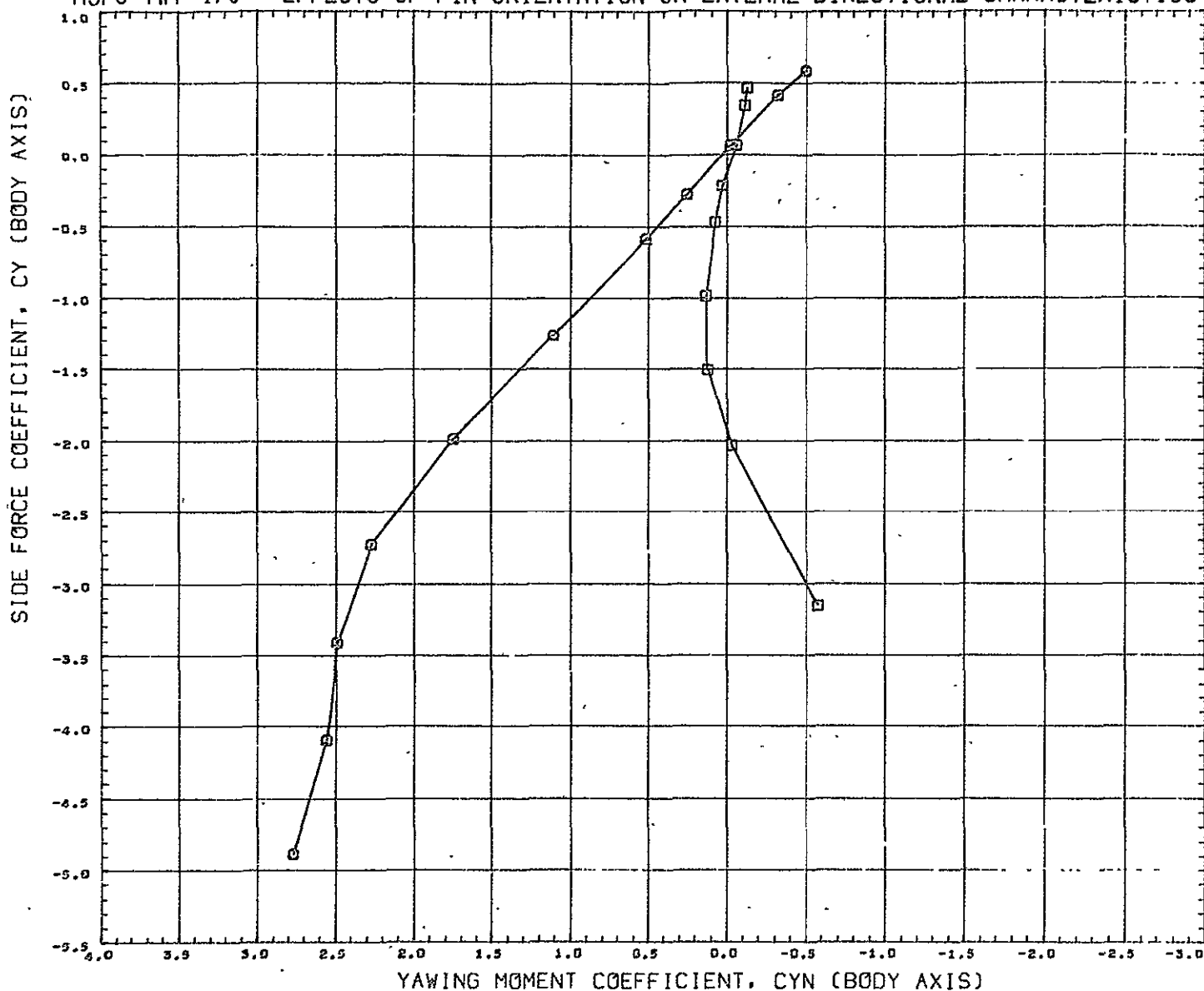


DATA SET SYMBOL CONFIGURATION DESCRIPTION
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 (J24082) \square TWT470 S-1C/GAC ORBITER BF10XHV5 BASIC

PARAMETRIC VALUES REFERENCE INFORMATION
 ALPHA 0.340 ORBINC. - 1.050 REFS 1.3960 SQ. IN.
 WNGINC 4.000 HTAIL 0.000 REFL 1.3330 INCHES
 PHIB 0.000 REFB 1.3330 INCHES
 XNRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

MACH 1.302

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS

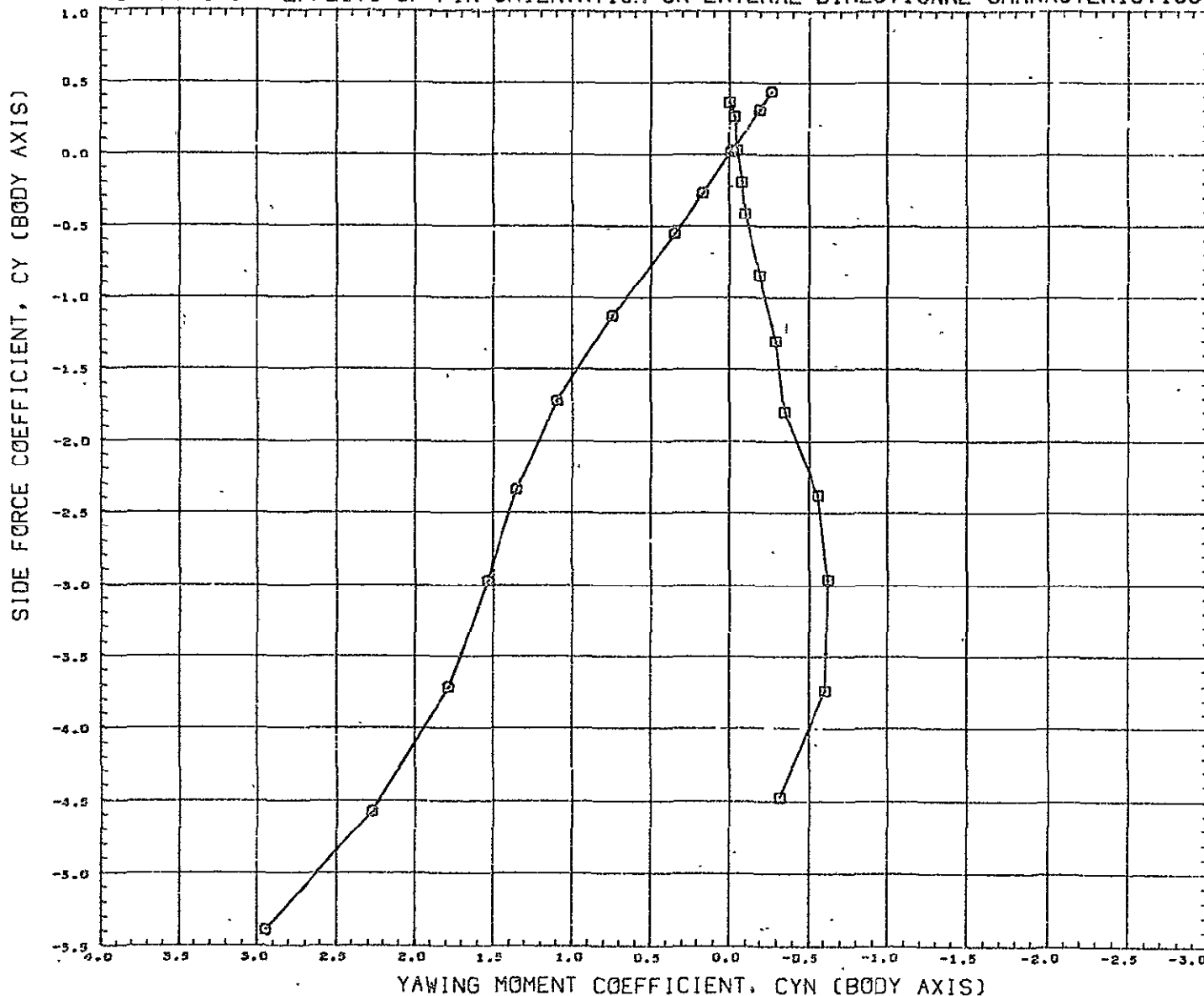


DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (A20132) \square TWT470 S-1C/GAC ORBITER BF20WHVS CRUCIFORM
 (J24002) \square TWT470 S-1C/GAC ORBITER BF10WHVS BASIC

PARAMETRIC VALUES REFERENCE INFORMATION
 ALPHA 0.340 ORBINC - 1.050 REFS 1.3960 SQ. IN.
 WNGINC 4.000 HTAIL 0.000 REFL 1.3330 INCHES
 PHIB 0.000 REFB 1.3330 INCHES
 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

MACH 1.400

MSFC TWT 470 EFFECTS OF FIN ORIENTATION ON LATERAL-DIRECTIONAL CHARACTERISTICS



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (A24132) \square TWT470 S-1C/GAC ORBITER BF20MHVS CRUCIFORM
 (J24082) \square TWT470 S-1C/GAC ORBITER BF10MHVS BASIC

PARAMETRIC VALUES REFERENCE INFORMATION
 ALPHA 0.340 ORBINC - 1.050 REFS 1.3960 SQ. IN.
 WNGINC 4.000 hTAIL 0.000 REFL 1.3330 INCHES
 PHIB 0.000 XMRP 5.2640 INCHES
 YMRP 0.0000 INCHES
 ZMRP 0.0000 INCHES
 SCALE 0.3366 PERCENT

MACH 1.953